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THE MOUNTAIN WORLD

1953

SWISS FOUNDATION FOR ALPINE RESEARCH

THE MOUNTAIN WORLD
1953

EDITED BY
MARCEL KURZ

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LUCIE EGGLER-DURAND • HANS ROELLI

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PANORAMA (at back of book)
Summits overlooking the Khumbu Glacier, showing route to South Col and Everest
(from photographs by André Roch, mounted by E. Steiner)

PREFACE

This volume of *The Mountain World* is the first of an annual publication which, by publishing the same material in three languages, seeks to bring together explorers and mountaineers of various countries, with the underlying wish that we be stirred in common to tasks of value to the world, that despite differing outlooks two principles be anchored in the minds of all concerned—*respect for the achievement of others* and *disinteredness regarding the nationality of ones own achievements*.

The Swiss Foundation for Alpine Research, in devising for the titular emblem of each volume a cross enwreathed with a climber's rope, trusts that this device may not be identified with the emblem of any nation. As the Red Cross, exactly reversing the colours of the Swiss national flag while maintaining its form, raised it to an expression of world-wide validity, so we regard the acceptance of our simple rope-encircled cross upon a supranational level as the symbol of a common endeavour, an *e pluribus unum* dedicated to Alpine achievement in exploration and mountaineering.

We realise that our objective is beset with snags; and we trust that our translators will increasingly succeed in communicating to readers in other languages the essential meaning of the original, that they will not in etymological rage be carried away from the primary meaning of their authors. This is however subject to the right ruthlessly to eliminate anything that conflicts with our general principle permitting nothing to detract from others' achievement nor individual success to be nationalistically glorified in that spirit of arrogance which has lamentably conflicted with the peaceful collaboration of peoples.

The most important mountaineering achievement of 1952 was the opening up of the south-western approach of Everest, only two years after the Khumbu Glacier was first trod by man. *The Mountain World* is indebted to Elizabeth S. Cowles for a description of those days; we are likewise indebted to Marcel Kurz for his exhaustive survey of a century of Everest history.

We have let each member of the spring 1952 Everest Expedition personally give his account, so that the reader may have the value of first-hand reports of the experiences of those taking part in the expedition. Especially valuable are the physiological reactions at great altitudes and the conflicting trends of acclimatisation or adaptation and organic deterioration. We considered the geological information about eastern Nepal sufficiently important to justify its lavish illustration with sketches. Separate from the expedition reports proper, Ella Maillart has contributed an essay on the cultural life of Nepal.

This volume would have been unbalanced in its composition had we not been able to include three generously illustrated essays on the exploration of mountain areas of a very different structure in countries far distant from the Himalayas, two on the Andes, being Hans Ertl's account for *The Mountain World* of climbs in Bolivia and Piero Ghiglione's account of climbs in southern Peru, while a group of essays on extensive expeditions and climbs gives a picture of the life of geologists in eastern Greenland.

Translations from the German were provided by Brian Lunn and E. Noel Bowman, and from the French by Malcolm Barnes.

The illustrations to this volume have been reproduced on a unified plan. Pictures of large format assume that the photographers will take into consideration that larger negatives are preferable to those provided by the miniature camera.

We invite particular attention to the illustrated survey at the back of the book, which gives an extraordinary panorama from a lofty vantage point of the range from Nuptse to Taweche. This serves the purpose of elucidating the names and altitudes of the points around the Khumbu Glacier. In this some new Tibetan names are published for the first time, and names which had been forgotten are recovered from oblivion. There is one adjustment that seemed especially important—Lho La means South Pass, so called because explorers from the north named the pass from their own viewpoint; but those pioneers have vanished and Everest remains. Since Lhotse, moreover, means southern mountain, the Lho La, relative to Everest, should be situated between Everest and Lhotse; the orphaned col west of Everest (formerly Lho La) has therefore been renamed Khumbu La.

After a long illness the great mountaineer Gustav Hasler died at Grindelwald on 9th July 1952 at the age of seventy-five. The Swiss Foundation for Alpine Research desires to preserve the memory of this man, its selfless friend and counsellor, who was seized as a youth with a true passion which kept him amongst his mountains throughout his extraordinary life. *O. G.*

GUSTAV ADOLF HASLER
1877–1952

By Othmar Gurtner

Everlasting things are good; therefore many practices change slowly. In many places it is still the custom that each year good mothers put a stiff collar on the lad who has reached school age, and accompany the young scholar with his bright satchel to the little gate of life. Spring weather smiles upon the excursion, decks the chestnut trees with red and white candles, and shows the silvery budding leaves of the elms, giving to this important day a benign and welcoming countenance.

It was in the spring of 1884 that a carefully nurtured, though somewhat delicate boy, came forward and with a smile of satisfaction from Fräulein Aeschbacher was entered as Gustav Hasler in the list of her flock. For it was reasonable to expect that the only son of the Director of Telegraphs, awarded a doctorate *honoris causa* by Bern University, should prove to be an industrious and gifted pupil. In due course, in 1888, the boy passed from the private school to the *progymnasium* and in 1892 to the fourth form of the polytechnic branch of the city secondary school; indeed he glided through all these phases as smoothly as a trout over the pebbles in the bed of a stream.

But when next spring the fifteen year old boy moved on to the third form and it became apparent that athletics were proving more troublesome to the rather awkward Gustav than Pythagoras, his parents did not hesitate—Gustav must have a course of treatment. Two approved remedies were sought as a cure, change and rest: walking and taking chalybeate waters with an iron content. It would seem that chance thereby combined two factors which, operating singly, would have been without significance, but operating on each other set fire to a life long enthusiasm which was to overcome all obstacles.

The Hasler family usually spent the weeks of hot weather in the country at Oberried. Here was a *gloriette*, a light stone garden house built by Niklaus Sprüngli a hundred years before; on its architrave were carved the words, *Hoc erat in votis*, "This accords with my desires". Someone must have rendered this quotation from Horace into a proverbial phrase intelligible to the boy; for, devoid of relevance to the logarithms and formulae of the polytechnic student, *hoc erat in votis* must have sunk deep into his spirit.

To call this forth a new environment was needed; in the spring of the year the family unwittingly contributed to this, disclosing to the boy a new gleaming world. For when the fourth-form pupil was allowed to go with them to Grindelwald, it was to the Bear Hotel that they took him. In the evening Gustav could watch a quadrille in the ball-room, and he was enlightened as to the dancers, they were English. In the hall were two robust figures of leathery visage, rather awkwardly twisting their broad-brimmed hats; he learned that they were guides. The Bear Hotel, where hobnailed boots and tweeds were deemed as appropriate as faultless evening dress, must have made an indelible impression on the boy, though he could not guess that in a few years he was to meet there a man in whose presence he would feel, as did Jürg Jenatsch before Duke Rohan, "This man is my destiny".

Having purchased a long alpenstock, Gustav Hasler set out over the Wengernalp on an overcast morning of July 1893. Disappointed by a rain cloud, he lay down with his alpenstock; but when quite soon he continued under a cloudless blue sky, the proximity of the ice-avalanches from the Jungfrau dissipated all his doubts, and striding along in his enthusiasm he had soon crossed the Little Scheidegg to Grindelwald, and by evening he had crossed the Great Scheidegg, and was approaching Rosenlaui with the wild crags of the Engelhörner glowing red above him. Whether he took the waters of Schwendikaltbad or Rigikaltbad, the impressions of his holiday walks remained vivid in his mind. As though to give a real objective to the *hoc erat in votis* stirring in the depths of his mind, Gustav Hasler made it a rule each summer to go up one of the mountains which provide a point for viewing the surrounding peaks: his choice was good, the Niesen, the Brienz Rothorn, Pilatus, the Faulhorn.

But things did not seem to be going well. He was taken from school, and the cures were more prolonged. Yet father and son were in complete harmony, and it is significant of their companionship that it was the persistent advocacy of his son which led Dr. Gustav Hasler to acquire extensive land outside the city in order to facilitate, by the construction of new plant, the contemplated development of the telephone as well as the telegraph.

Having reached the age of twenty, Gustav Hasler bought himself an ice-axe; in accordance with the older people's advice it was rather long in the shaft. In mid-July, accompanied by a local guide, he climbed the Titlis; there was no more talk of cures and spas. At the beginning of August the long ice-axe appeared at the Scheidegg. Hasler sent to the Bear Hotel for two guides; they duly arrived, guides of the old type with well-bearded faces, and the Eiger was climbed.

Finally, at the Bear, Gustav Hasler met Christen Jossi, "of the Caucasus", as he was called after 1888, when he climbed Dykh-tau with Woolley, where Donkin and Fox rest in an avalanche grave with their guides Fischer and Streich. Despite his fifty-one years, father Jossi was beardless; there was a friendly twinkle in eyes set in an open face. But since this famous step-cutter, a first class guide, was tied by alternating engagements—Sydney Spencer, for instance, climbed with Jossi for twenty-four summer and fourteen winter seasons—there was no chance of the newcomer being able at once to secure him. In the Alpine valleys they say that an old bear can cross five passes in one night. Such was the strength of father Jossi; he thought nothing of starting off by starlight, and then going on until the following evening, indeed for a second night and the day after that. Hasler was to become well acquainted with these "Marathons", as he was soon to call Jossi's endless treks. We should bear in mind, moreover, that all this was before skis. Webbing oversocks and, when necessary, snow-racquets seemed to Jossi adequate even for reaching high mountains through deep winter snow, bearing only in mind that wading through snow is a lengthy business, so that one must always keep going to have the time needed for the peak itself.

When Hasler arrived at Grindelwald in Christmas 1898, he already heard the bear growl; the very same evening rucksacks were packed, and soon before midnight the three set off, Johann Heimann being the third man, for Jossi did not climb alone with a new man until he had acquired confidence in his staying power and capacity. Gustav Hasler was facing an important test. On the way to the hut the snow was lying fresh, and they had been swinging their lamps quite a time before they had stamped their way round the Bänisegg and scrambled over the boulders by the ice-fall; it was seven in the evening when they reached the Schwarzegg Hut. Only a short rest there, for before midnight Jossi began to put on his oversocks, and soon they were out in the night. At two o'clock in the afternoon a violent storm attacked the summit ridge of the Schreckhorn which had just been reached by the three climbers who have been in a blizzard from the saddle. At once they had to turn their backs to the wind, while the storm howled over the sharp ridge. But far below in the couloir and between the crags the snow was beginning to lodge; they had to make their way down very cautiously. As darkness fell they leapt over the bergschrund, and made their way down the névé through mist and blizzard, reaching the hut at nine o'clock. The storm and snow continued all night, and at seven they set off again. Jossi plodded over the glacier, finding the way through the "Enge" with his sixth sense; the "Grüne Wäng" being cautiously traversed, they found the Zäsenberg Hut. This winter ascent of the Schreckhorn proved for Gustav Hasler to be the beginning of a long friendship with father Jossi, his son Christian and his daughters' husbands, Peter Bernet and Fritz Amatter.

Shortly after his return from Grindelwald, Gustav's father died on 5th January 1900 in the middle of elaborate unexecuted plans. An inflammation of the lungs thus brought the twenty-two year old Gustav suddenly face to face with a gigantic task. He steeled himself, and seemed to appreciate what was expected of him. Some hundred workers now received their daily bread in *his* works. While the technical management was left to well-trained experts, general policy and financial decisions depended upon the maturity of his own judgment and character. The hard school of the mountains proved a blessing to Gustav Hasler, who was modest by nature and was little practised in public affairs. In fifty years of industrious attention the son made a large scale productive enterprise of his father's workshops.

After four exhausting months of management, Hasler felt the imperative call of the mountains; he longed for the untalkative companionship of Christen Jossi, the man who knew what to do in every situation.

Meeting at the end of May 1900 in the Matter valley, Hasler and Jossi, having engaged a second guide from Saas, Heinrich Burgener, crossed the Nadelhorn from Randa to Saas-Fee by way of training. After some doubtful weather they went up from Zermatt to the Bétemps Hut. Burgener may have had doubts when Jossi fixed eight in the evening for leaving the hut; but the three waded through snow and crossed the Lyskamm to bivouac on the Lys Glacier. Via Aosta and the Saint Bernard they returned to Zermatt to make the first Matterhorn ascent of the season. Burgener declined to go, and so did the Zermatt guides. Jossi wired his son-in-law Peter Bernet to come to Zermatt. Jossi and Hasler meantime investigated conditions on the mountain. And as soon as Bernet arrived, at four o'clock in the afternoon, they set off for the Hörnli Hut. Under a starlit sky tracks were made up the Matterhorn, where heavy snow had fallen, and it was not until two in the afternoon that the top was reached, where the three climbers took an hour's rest, the weather remaining steady. On their return they reached the Hörnli Hut at midnight.

Jossi being engaged by other climbers until the end of August, Hasler climbed the Gspaltenhorn and the Weisse Frau with an amusing new companion, "Lenihänsi", with whom he was soon to have many a remarkable climb, and who now cut seven hundred excellent steps up the sheer ice beside the ridge of the Weisse Frau. The old bear Christen Jossi roused himself as usual at Christmas. With Hasler and Bernet he waded to the Stieregg Hut; then they trudged over the Strahlegg Pass and celebrated Christmas with a waiter in the cellar of the Grimsel Hospice.

Hasler began to feel the ever stronger pull of Grindelwald. In two years he had become one of the best ice-men in the Oberland. A reliable mountaineer of great endurance, he saw problems that were waiting to be solved; he was winning esteem in the inner circles of the intimate climbing community. On 12th February 1901 Hasler was on the Little Schreckhorn with his friends, while the venerable Alpine Club in London held a ballot, after which the President, James Bryce, announced that seven members had been elected, including G. A. Hasler. At the beginning of May that year Hasler with Jossi and Bernet set out from the Gleckstein Hut for an approach to the Wetterhorn from the Hühnergutz Glacier; by this rather unusual route the tower-studded gable of the Scheidegg Wetterhorn was found. Two days later a preliminary attack was made from the Gleckstein Hut, and it was found that to climb over a spur they had to plant a sort of ladder. A week later they conquered the redoubtable "Grindelwald Dru". Hasler wrote an account of it for the *Alpine Journal;* one of the photographs, showing the light caught by the spring snow on a buttress, won such admiration that many years later it was the prize exhibit at an Alpine Club exhibition. In November Hasler and Jossi again climbed the Wetterhorn from the Hühnergutz Glacier; now Jossi felt that the descent by this route must also be accomplished. A continuous chain of two thousand steps was cut in masterly fashion in the brittle autumn ice, and Hasler knew that father Jossi had confidence in him; otherwise he would not have ventured upon such a bold descent.

Gustav Hasler continued to make first ascents by new routes, especially enjoying the varied climbs in the Chamonix Aiguilles, and making a fine first ascent of the Aiguille du Moine. The wild cat climber Helene Kuntze was often with the party. Hasler was also collaborating with the aged and contentious Rev. W.A.B.Coolidge in a new edition of *The Climber's Guide;* then he fell out with the reverend gentleman, and was cast like several others from a library filled with fully scribbled notebooks into the darkness of the outer world.

He now collected "Lenihans", a carpenter by trade and a bold chamois hunter, whose real name was Johann von Allmen, and he brought in a friend from the same village, Fritz von Allmen; they were conveniently distinguished by their local nicknames, "Lenihans" and "Schaffritz". With them he made the first ascent of the south face of the Gspaltenhorn. Making their way from the snow of the Tschingelfirn into a narrow gully, the three came within perilous range of a couloir of falling stones which shot out of the hollow above as from a gun. The gap was very narrow, the rock friable and wet with melted snow, while right in the heart of the gully ice was sticking to the rock, and cutting into it was difficult in the narrow space. Finally there was an overhanging boulder to surmount; at noon they reached the hollow by the upper gendarme of the ridge. An hour later, black as chimney sweeps from the scree, and dripping with ice-water, they were lying on the top slab of the Gspaltenhorn. If they listened, "Lenihänsi" and "Schaffritzi" might have heard Gustav muttering in a strange tongue—words from the depths of his subconscious, *hoc erat in votis.*

An interesting new route up the Aletschhorn with Fritz Amatter, Jossi's other son-in-law, during which expedition they used skis, a new fangled contraption with which Jossi would have nothing to do, resulted in the shoulder that pierces right into the ice under the Aletschjoch being called the "Hasler-Rippe"; they then attacked the long projected first ascent of the east face of the Finsteraarhorn, for which some days spent near the Concordia Hut served as a reconnaissance. On the 15th July they started from the Grimsel to assault the face. After a long rest they left the Pavillon Dollfus at half past four in the afternoon, strolling towards their face over the Unteraar and Finsteraar Glaciers, holding their magnificent objective in full view, as the peaks' shadows lengthened and the day faded out. In the twilight they hacked out a shelter under a rock that projected like a crab's claw at the extremity of the rib descending straight from the summit. There they sat, 3000 ft. under their peak, spending the time until dawn in making tea. At half past three they left their bivouac, and Hasler led up rocks of increasing steepness until they were level with the Studerhorn opposite, when they felt that a half hour's rest had been well earned. At a quarter past eight Amatter attacked the slabby rock; the higher they got, the less purchase did they find for their boots, and hoisting up their rucksacks became increasingly difficult. Hour after hour the climb proceeded until at last they reached the great grey buttress, that is at the height of the Hugi Saddle. Here they were in a position that abounded in painful quandaries. Hasler had to lower Amatter sideways to an iced snow-ridge, and he now watched a really desperate climb by Amatter along slabs. Hasler had to savour all the joys of his companion's magnificent achievement, eight hours after their start, and as he reached Amatter he appreciated that the rope did indeed make them comrades in fate, for had been no security. It seemed hours since leaving the grey buttress, when at last Amatter's resounding jodel announced that the summit was in sight. Over the last linking slabs easy rock was reached, and at seven in the evening they reached the top.

This truly great mountaineer in the classical tradition could look back on a long achievement; the salient features have all been taken from the more brilliant period of his climbing, a time for many readers in the dim past; but the whole series of his mountaineering exploits would fill volumes. To round off this narrative it remains to be related that Gustav Hasler took a course and qualified as a Bernese guide and sometimes plied his ice-axe as a certified guide. For after he had been Marie Rosalind Simpson's guide, with Ulrich Fuhrer, over the Great Gelmerhorn, and with Amatter up the Schreckhorn, he experienced with her a long succession of mountain experiences during a marriage which ran its happy course in the same rhythm of work and mountaineering. Hasler spent several years in England and contributed much to the deep friendship between the two countries. At the same time, plans for huts and young people's ventures won his generous assistance. Without his energetic support the Trift Hut, the Concordia and later the rebuilding of the Engelhorn Hut of the A.A.C.B., of which Hasler was an honorary member, could scarcely have been achieved. In his last years, rendered melancholy by personal sorrows, Hasler took an active part as a member of the committee of the Swiss Foundation for Alpine Research. He remained always most closely attached to the mountains around his Grindelwald home, especially the Faulhorn, which he went up a total of two hundred and fifty times until his old age.

The most beautiful tribute to Gustav Hasler is in the simple letter written to him by Fritz Amatter on the occasion of the thirty-eight anniversary of their great day on the Finsteraarhorn: "Truly it has been granted to few people to achieve in life the highest summits professionally and personally, as has been granted to you and your wife."

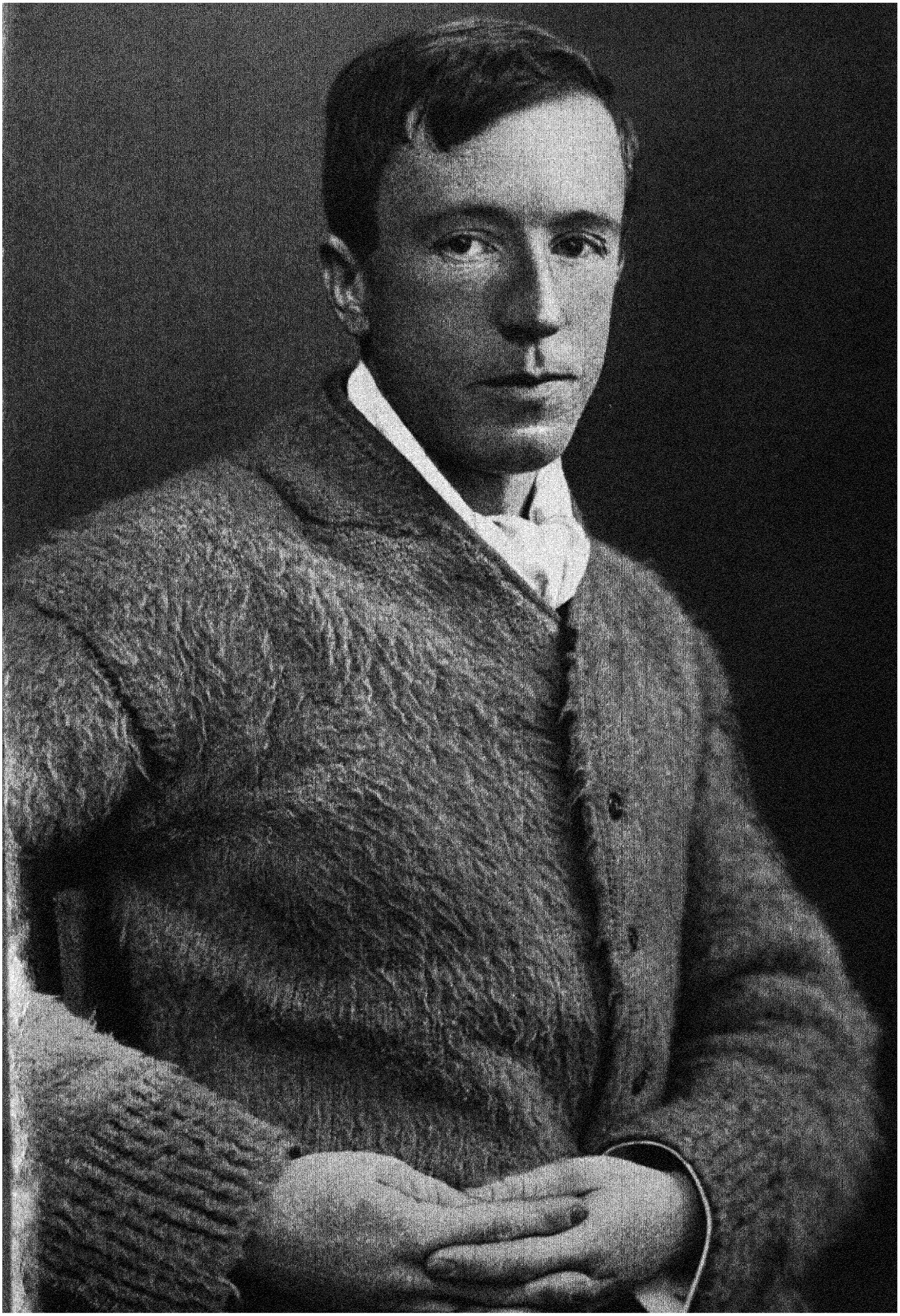
Gustav Hasler's Winter ascents

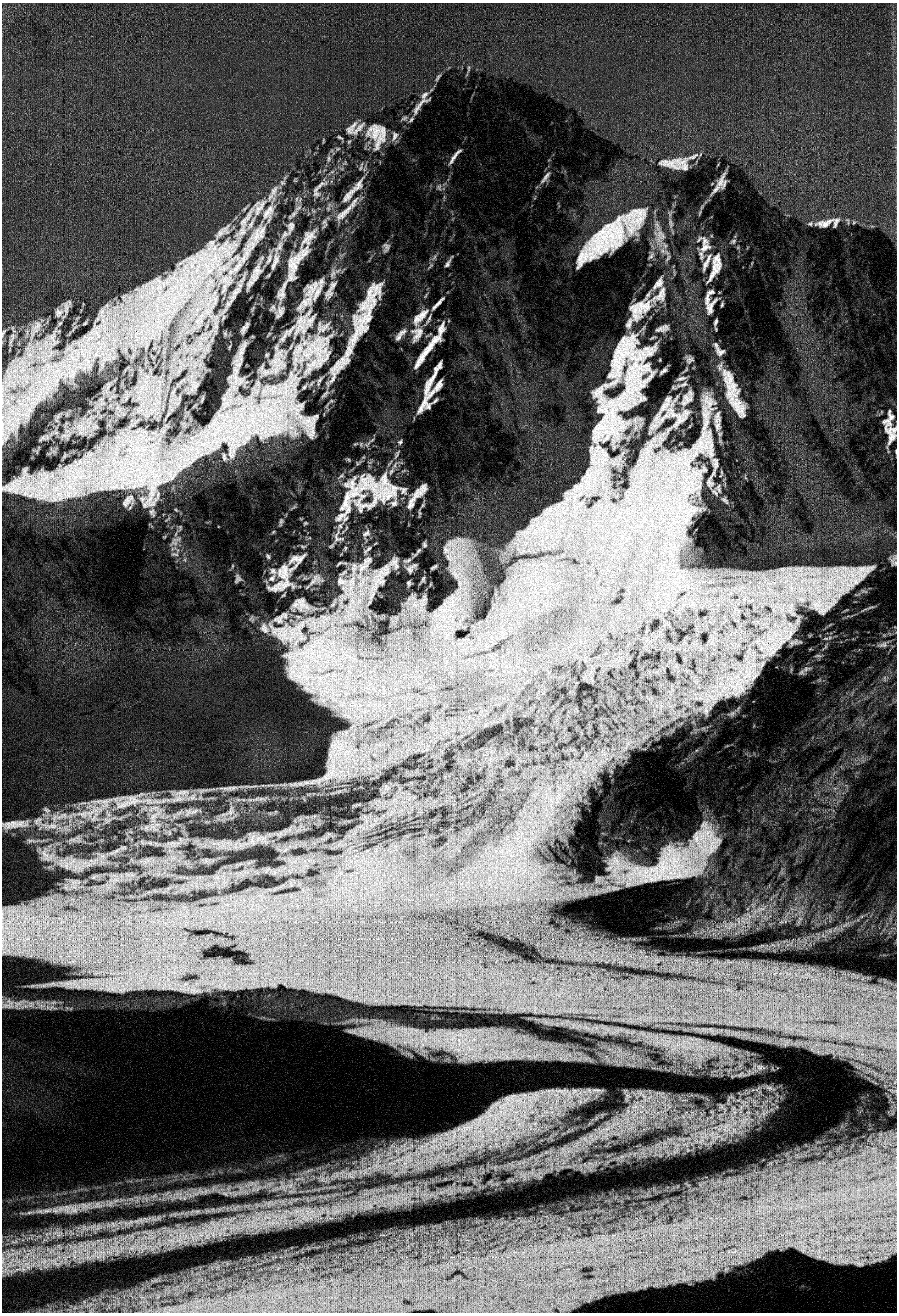
1898, December 27/29: Schreckhorn
1899, December 20/23: Wetterhorn (Gleckstein to Dossenhut)
1900, December 24/27: Galenstock (approach from Strahlegg–Grimsel)
May 21 : Nadelhorn (Festi Hut to Saas)
30 : Lyskamm (Bétemps Hut to Gressoney)
1901, February 12 : Klein-Schreckhorn
April 3/8 : Finsteraarjoch – Agassizjoch – Hugisattel – Oberaarjoch – Grimsel
22/23: Schreckhorn
May 2/4 : Wetterhorn (from Hühnergutz Glacier)
12/14: Grindelwald Dru (1st ascent)
15/16: Finsteraarjoch
29 : Mont Blanc
October 11 : Abschwung
13 : Wildschloss (1st ascent)
29 : Wetterhorn (from Hühnergutz Glacier)
November 3 : Wetterhorn (descent to Hühnergutz Glacier)
4/5 : Gross-Engelhorn
8 : Jägiburg
1902, January 13 : Eiger
16 : Schwarzhorn
17/21: Jungfrau–Mönch–Fiescherhorn–Klein-Fiescherhorn (the latter 1st winter ascent)
1903, March 5 : Piz Bernina
14/16: Aiguille Verte
1904, January 1 : Schwarzhorn
6 : Gspaltenhorn

21/23: Strahlegg
24/27: Aletschhorn ("Hasler-Rippe")
May 2 : Wetterhorn–Mittelhorn
16 : Rosenhorn–Wellhorn
May/June 31/ 1: Schreckhorn–Nässihorn
November 14/16: Klein-Schreckhorn (Gleckstein to Schwarzegg)
December 22/24: Finsteraarhorn
1905, January 12/17: Grimsel–Oberaarjoch–Grünhornlücke–Lötschenlücke (ski)
May 31 : Grand Combin
1907, January 19/21: Schreckhorn
1908, January 8 : Strahlegg (ski)
14 : Mönch
May 21 : Schreckhorn
1911, November 4/ 5: Jungfrau–Mönch

Plate 1: Gustav Hasler at twenty-four years.

Plate 2: Finsteraarhorn (north-east face) from the route to the bivouac site on the upper rocks of the open pincers, in the fall line of the peak on the largest of the ribs.





MOUNT EVEREST

A CENTURY OF HISTORY

By Marcel Kurz

The story of Mount Everest in relation to man seems to begin abruptly at Calcutta in 1852; this centenary is a curious coincidence. In the crushing heat of a summer day the big building of the Survey of India was slumbering peacefully. Not a sound could be heard. Suddenly the chief surveyor rushed into the office of the Surveyor-General and exclaimed breathlessly: "I have discovered the highest mountain in the world!" The results of the triangulation carried out three years earlier, from the floor of the Indian plain, had only just been completed. For this summit they gave the unprecedented height of 8840 m. (29,002 ft.). These calculations were later revised by taking atmospheric refraction into account and the height was taken to 8888 m. (29,161 ft.). To-day this figure is again disputed. Burrard thinks it too little, others think it too great; frequent earthquakes may perhaps have increased or diminished it.

Meanwhile two Americans, Roosevelt and subsequently Rock (1929) claimed to have discovered a mountain in Eastern Tibet which surpassed 9000 m. (29,529 ft.). The mountain in question was Minya Konka (known to-day as Minyag Kangkar) whose height was reduced by Imhof's inexorable theodolite to 24,902 ft., the highest point in China. Similar illusions are not uncommon. Amnyi Machen, also in Eastern Tibet, likewise exceeded 9000 m. in the imagination of another American. It was only necessary to consult photographs to be convinced that it reached 6000 m. (19,685 ft.) at the most. Everest's supremacy is thus to-day well established. Its sedimentary rocks once formed the bed of the ocean; to-day they form the backbone of the Himalayas and the frontier between Tibet and Nepal, two regions long closed to white men.

So the height was fixed, but the world's highest mountain had no name; that at least is what the surveyors maintained, who designated it by the simple Roman numeral XV. Such a peak could not remain anonymous! Nevertheless, a name would be given it. An earlier Surveyor-General of India, who had retired in 1843, was Sir George Everest, and the mountain was therefore honoured with his name.

Until then it had been confused with Gaurisankar (23,440 ft.), which was much further west in Nepal.

In 1921, on the occasion of the first expedition to Everest, the Tibetan passport given to the English by the Dalai Lama specified the summit as *Chomolungma*, which was translated as "Goddess-Mother of the Land". Later, Sir Charles Bell, one of the greatest experts on Tibet, claimed that the summit was called *Kang Chamolung* ("Snow of the Country of the Birds") and that this name appeared on the 1935 passport.

But the experts in Tibetan are far from agreeing. Thus Dr. Schubert of Leipzig maintains that the first name should be written *Jo-mo-lun-ma* (" Queen or Goddess Lun-ma") and that the second was none other than *Cha-ma-Lun* ("The Hen-bird Lun"). These two forms are, moreover, almost identical. But *Lun* (feminine, Lun-ma) can also signify air, ether, *wind*. This wind is visible at the summit of Everest when it lifts the powder-snow from the northern slope and hurls it, in the form of a white plume, into the opposite precipices. Schubert claims that it is this white plume which has caught the imagination of the Tibetans and accounts for the mountain's name. The plume suggests a bird, quite naturally sacred, and the interpretation of the wind by a bird is frequent. The two forms *Jomolunma* and *Chamalun* thus describe the same point, the summit of the world, evoking equally the goddess of the wind and the bird of the wind. Now the form *Chu-mu-lang-ma* had already appeared in 1717 on a map of the Manchu dynasty, drawn up by Tibetan lamas. It was transcribed as *Tschoumoulancma* by d'Anville in his map of 1733. Truly, there is nothing new under the sun. Let us therefore leave the philologists to their disputes and follow, instead, the efforts of man to conquer this topmost peak, still inviolate.

When he was Viceroy of India, Lord Curzon in 1905 suggested to the Royal Geographical Society and to the Alpine Club that they should get together with a view to organising a first reconnaissance of the mountain. Freshfield, Bruce, Longstaff and Younghusband were then the pillars of these two societies which have marched hand in hand ever since. Nevertheless, they did not succeed in obtaining either from the Dalai Lama or from the Maharaja of Nepal the authority to enter their respective countries.

In 1909, the Duke of Abruzzi, victorious in every continent, ran into the same political obstacles and had to be content with the Karakoram in his struggle for the record height of 7500 m. (24,607 ft.). (*The Times* records that an expedition had already been planned in 1893. It was probably the one of which Owen Glynne Jones, who was killed on the Dent Blanche in 1899, had been dreaming. In fact, one great writer still with us to-day, Geoffrey Winthrop Young, records that Jones invited him to take part in that expedition "shortly before his death". This plan also ran up against the Dalai Lama's veto.)

However, in 1913 Captain Noel succeeded in forcing his way in and crossed the frontier for a secret reconnaissance of the eastern approaches to Everest. He passed from Lhonak to Tibet by the Chorten Nyima La (19,090 ft.), a pilgrims' pass, and from there to Tashirak by the Langpu La; but the Tibetans would not allow him to go further and forced him by threats to return to Sikkim at top speed and by the same road. It was probably on his report (favourable in spite of everything) that General Rawling based the plans for his expedition of 1914, a project that was torpedoed by the First World War.

After that war, Noel, on behalf of the Royal Geographical Society, and Farrar, on behalf of the Alpine Club, sought out the principal promoters of the future British expedition to Everest. Kellas had been prowling about the frontiers of Tibet for several years. He had even secretly sent one of his Sherpas to photograph the mountain from close up. As far as could be seen, the Tibetan side looked much more favourable than the Nepal side. Thanks eventually to Sir Charles Bell, who was then at Lhasa and knew the Dalai Lama personally, the latter agreed to give his authorisation. The exploration of Everest could at last begin.

In 1921, the expedition organised by the Royal Geographical Society and the Alpine Club, and led by Colonel Howard Bury, had as its object to explore the Everest massif, where no white man had ever penetrated. It fulfilled its task to perfection, thanks especially to the harmony which existed throughout among the participants, who were, moreover, not many. Its topographers, Major Morshead and Major Wheeler, with the help of native assistants, covered almost the whole massif between the gorges of the Rongshar and those of the Arun, and surveyed over 15,000 square miles in three months. This figure is nearly equal to the area of Switzerland and seems enormous to our critical view. However, the maps based on these surveys are perfectly clear and were quite sufficient for the needs of the time.

At the end of September, all the valleys on Tibetan territory which radiated from Everest had been explored and mapped.

Contrary to the pre-war plan, which advocated an attack from the eastern side (Arun), the expedition began its exploration at Tingri Dzong after having crossed the high Tibetan plateaus from Phari (Chumbi).

While Howard Bury and Wheeler were visiting Kyetrak and pushing up to the Nangpa La (19,050 ft.), Mallory and Bullock, entrusted with finding the best route to Everest, were busy in the Rongbuk valley and established their base camp beyond the monastery of the same name. Now, at last, they had found the right route.

Quite naturally, they ascended the main Rongbuk Glacier and reached the Nepalese frontier on the Lho La, at about 20,000 ft. What they could see of Everest was not at all inviting. Mallory wrote that the chance of reaching the gap between Everest and Lhotse from the west was not great. One cannot but be surprised that Mallory had lost time in exploring the West Rongbuk Glacier, which stretches away from the mountain, rather than endeavouring to come closer to it. He left the Rongbuk valley without suspecting that there was an eastern glacier, at that time in retreat and no longer joining the main stream. He had actually crossed the torrent which issues from this glacier, but had attached no importance to it. This water-course was then scanty and he thought it pointless to climb up to its source.

This simple little oversight lost the two climbers nearly three months. In fact, it was not until the end of September that they discovered the eastern glacier which constitutes the natural route to the Chang La or North Col (22,990 ft.) and Everest itself. Meanwhile, this glacier had been mapped by Wheeler, but contact between the climbers and the topographers seems to have been wanting.

One ought to say in their defence that permission to pass through Tibet had reached London rather late and that this delay had repercussions throughout the reconnaissance. The expedition only left Darjeeling on the 18th May and had arrived at the site in the middle of the monsoon. The whole reconnaissance took place during this monsoon and was very much impeded by the bad weather. They evidently reckoned on the fine September days for attacking the mountain, but the monsoon lasted till the end of that month and it was only at that moment that the right route was discovered.

It is surprising that so well organised an expedition, disposing strong resources and specially favoured, had not had recourse to an airplane to reconnoitre the mountain and take photographs. In a few hours' flight, a well-piloted plane, carrying a good photographer and an experienced climber, would have been able to bring back records which would have made it possible to settle the question and save the expedition three months of search.

However, this long investigation in 1921 was exciting for adventurous climbers —but also how tiring! Of the four climbers from the Alpine Club, one died on the way (Dr. Kellas) and another (Raeburn) fell ill and had to be evacuated. Thus the whole task rested on the shoulders of Mallory and Bullock, and one cannot but admire the enthusiasm and tenacity with which they accomplished it. As in the two succeeding expeditions, Mallory was on this reconnaissance the soul of the mountaineering section. The conquest of Everest had become for him an obsession which only ended with his death very close to his goal.

The expedition's base was later transported from Tingri to Kharta and the exploration then began of the Karma valley and the Kangchung Glacier, which descends gently from the eastern face of Everest. But on this side the mountain presents precipices which leave no hope. They then passed into the neighbouring valley, further to the north, the Kharta valley itself. On the 1st September, Mallory and Bullock set up their base camp, but it was only on the 19th that they could leave it to ascend towards the Lhakpa La (22,200 ft.). This col was reached on the 20th and it was from there that they at last discovered the East Rongbuk Glacier and the natural route to the North Col (22,990 ft.). This was reached very easily and marked the end of this reconnaissance.

They did not proceed further because of the very cold wind, which was blowing a gale, but they were certain that the way was open towards the summit and that it followed a wide rib without presenting any serious obstacle. After that came the retreat to Kharta and the return to Darjeeling by way of the Tibetan plateaus.

This expedition had scarcely returned to London when a second was organised. This time it was led by General Bruce, the greatest expert on the Himalayas, while the participants were more numerous as well.

Having learned from experience to take advantage of the period of good weather before the monsoon, the 1922 expedition left Darjeeling on the 26th March, reaching Shekar Dzong on the 24th April, and set up its base camp at the foot of the Rongbuk Glacier (16,400 ft.) on the 1st May.

They quite naturally followed the East Rongbuk Glacier and there set up three camps. Camp III—the advance base—was at 21,000 ft., right at the foot of the North Col. On this col, at 22,990 ft., they established Camp IV, and it was from there that the two attempts upon the summit were made, with a single intermediate bivouac at about 25,000 ft. On the 21st May, Mallory, Norton and Somervell ascended in the direction of the Shoulder (27,390 ft.) and without oxygen reached an altitude of just under 27,000 ft. thus beating by more than 2300 ft. the altitude record set up by the Duke of Abruzzi on Bride Peak in the Karakoram.

On the 27th May, Finch and Bruce (the General's cousin), after having spent two bad nights at the bivouac and consumed almost all their provisions, reached 27,235 ft., using oxygen. Finch seems to have found the right route, that which runs along the wide ledges on the western face of the summit ridge. Exhausted by lack of nourishment and a breakdown of the oxygen supply, they were unable to go higher.

The monsoon arrived with the beginning of June and on the 7th, when trying to ascend to the North Col, Mallory's party was caught by an avalanche which killed seven porters. The mountain had to be abandoned for that year, but the expedition had proved that on easy ground one could climb without oxygen to nearly 27,000 ft.

The third expedition took place in 1924, at almost the same dates, and followed exactly the same itinerary as the one before.

Between the North Col and the summit two intermediary camps were established: V at 25,260 ft. and VI at 26,700 ft. From Camp VI two assaults were made. On the 4th June Norton (the expedition's leader) and Somervell, following the Finch-Bruce route of 1922, without oxygen reached about 28,125 ft. in calm and very favourable weather. On the 8th, Mallory and Irvine ascended towards the summit using oxygen. They were seen for the last time at about 28,000 ft. and it is possible that they reached their goal—but they never came back. What had happened? There one is lost in conjectures.

Eight years passed without anyone being able to attack Everest, nor to search for the bodies of those who had perished. This interval must have seemed terribly long to the British. As is known, the Dalai Lama, omnipotent ruler of Tibet, had forbidden all further expeditions. Seeing that nothing could be hoped for from that side, the British made an official request of the Maharaja of Nepal with a view to attacking the mountain by the Nepalese face. But the Maharaja took refuge behind the Treaty of Segaulie of 1816. Eventually diplomacy succeeded with the Dalai Lama, who granted authority for 1933.

Since neither General Bruce nor Colonel Norton were free at that time, Hugh Ruttledge took command of the expedition, which comprised some fifteen participants, including Frank Smythe and Eric Shipton. So as to achieve a slow acclimatisation, the expedition left Darjeeling as early as the 3rd March and reached the base camp on the 17th April, that is, twelve days earlier than in 1924. Unfortunately, the weather was worse than ever; the monsoon arrived sooner than usual, without even being preceded by the succession of fine days which generally characterises the transition. Thus the results were very meagre. On the 15th May the North Col was reached and connected by radio with base. Otherwise, all the camps were sited at the same places as before, except that VI was pushed higher, to 27,400 ft., on the ledges which run along the summit ridge. It was from that camp that the two attempts, both without oxygen, were made.

On the 30th May, Wyn Harris and Wager discovered the ice-axe which must have belonged either to Mallory or Irvine, about 60 ft. below the summit ridge and about 250 yards east of the first step of the summit, much lower, therefore, than the spot where N. E. Odell thought he had seen them for the last time in 1924. This ice-axe was in a perfect state of preservation and Harris exchanged it for his own on the return. The two friends lost much time examining the two steps of the summit ridge and finally reached the same conclusion as Norton, eight years earlier: that this ridge is impracticable. By way of the ledges (the famous "yellow band") they pushed as far as the big couloir and turned back very close to the same point as Norton, at 28,125 ft. On the 1st June, Smythe also reached this point; he was alone, for Shipton had had to give up. He spent a second night at Camp VI and the next day went direct down to the North Col. The monsoon arrived and the whole expedition left for Darjeeling, arriving there on the 26th July.

While Ruttledge's expedition was toiling towards its base across the high plateaus of Tibet, the two airplanes of the Houston Expedition were flying over Everest in a matter of a few hours. These flights took place on the 3rd and 19th April 1933. A quantity of photographs was taken and it was hoped to obtain from them sufficient data to complete the detailed map of the Nepalese side, but this map has never appeared! The original, on a scale of 1:50,000 is deposited with the Royal Geographical Society.

In 1935 the authorisation of the Dalai Lama arrived too late to permit the British to launch a large and official expedition before the monsoon. But as this "permit to attack Everest" was valid for a year (from June 1935 till June 1936), it was decided to take advantage of it at once by making a "reconnaissance" and by making the best possible preparation for the 1936 attack. This reconnaissance (the term seems somewhat misused) was entrusted to Eric Shipton. Its object was to study the snow conditions during and *after* the monsoon, which had never been done in that region except for a few days in September 1921, and to examine the possibility of other routes for the ascent, especially from the south-west.

Shipton's great merit is to have set on foot and led the first light expedition to Everest. He reckoned to get through on about two hundred pounds a head. He allowed himself only five companions, including his friend Tilman, and a topographer (Spender) whose job it was to make photogrammetric surveys. The expedition left Darjeeling on the 24th May with some fifteen of the best "Tigers", the well-known Nepalese Sherpas. It entered Tibet by way of Lachen and the Kongra La (16,840 ft.). Instead of making straight for the task, Shipton had the strange idea of first exploring the mountains surrounding Tashirak, which are of secondary interest, in splendid weather. The expedition then made for Rongbuk, where it arrived on the 4th July. Shipton was much surprised to see the north face of Everest completely free of snow and also as black as in 1933 before the monsoon. The days were warm and calm; the nights clear and cold. In short, the conditions seemed perfect for an attack. In less than a week the vanguard had gained the North Col. Never had this point been reached so quickly, which proves the great advantage of small expeditions over the large ones. But at this precise moment the weather changed entirely: the delayed monsoon broke out with great violence. Everest itself had to be given up, to fall back upon its satellites. However, the harvest was a fruitful one: two dozen virgin summits of over 6000 m. (19,685 ft.), two of over 7000 m. (22,967 ft.), and numerous passes. But it is very regrettable that Shipton did not go direct to Everest: had he reached the North Col fifteen days earlier, he would doubtless have triumphed. He had thus missed the finest opportunity ever offered. How many years will we have to wait for such a chance to present itself again? No one can tell. It was also a mistake not to remain on the spot till the autumn, as had been arranged, for the autumn of 1935 was one of the finest ever known in this region.

In August, Shipton pushed on to the Nepalese frontier at the point where it forms a snow saddle to the east of Pumori. This saddle, as we have said, had already been visited by Mallory in 1921. Like him, Shipton declared that it was hardly practicable on the Nepalese side. He contented himself therefore with taking a few photographs in the direction of Everest, but these photos did not completely reveal the upper part of the Khumbu Glacier, nor the access to the South Ridge by way of the Western Cwm. Sixteen years later he was to return to these quarters in search of the same solution and animated by new hopes.

One is astonished, in reading Shipton's story, at the quantity of eggs absorbed by the expedition. Each of the Europeans ate at least ten to fifteen eggs a day, and one of them had even broken all records by swallowing, in a single day, thirty-five eggs in different forms! They were not always fresh, Shipton adds, and they were obliged to scramble them and cook them so as not to notice the fact! One anxiously asks oneself what were the consequences of such a régime!

In 1936 the same group, reinforced by new members, put itself under Ruttledge's orders, with Smythe as second in command. While in the preceding years there had been every chance of success, this time there was none. It was a complete fiasco. Without being superstitious, one could certainly believe that there is a curse on expeditions to Everest, or that the mountain is haunted by demons. The Tibetans, who are Buddhists, believe that their God does not look kindly upon these expeditions and maintain that they will only bring misfortune upon the country. The base was established on the 30th April and the first news received by radio was the announcement of bad weather! The real monsoon broke at the end of May, three weeks early, while that of 1935 had been three weeks later than the normal date! All attempts were halted by the squalls or by the danger of avalanches and it was a miracle that the expedition returned without loss.

After his conquest of Nanda Devi (25,645 ft.) Tilman had become the man of the hour and it was he who took command of the seventh expedition in 1938. An inveterate ascetic, he had the great merit of simplifying the problem by sacrificing everything superfluous. His six companions even complained of having been very hungry. His party was of top strength. The budget amounted only to £2500.

The expedition arrived at Rongbuk on the 6th April, earlier than all its predecessors. Forty-five porters from Solo Khumbu (Nepal) arrived punctually the next day by way of the Nangpa La (19,050 ft.) with 600 kilos of provisions. Against a pale blue sky and in an icy atmosphere, Everest rose up nakedly, drier than ever before. Conditions seemed excellent, but the cold was too great and the wind too violent to permit an immediate attack—at least, so it was thought. Tilman therefore discharged half of his porters and retired to look after the party's sick. Everyone was persuaded that the ascent would not be possible before the end of May. From the 5th it snowed abundantly for a week, the summit became unapproachable and the succession of fine days which were counted on before the monsoon did not eventuate. On the 24th May, forty-two days after its arrival at Rongbuk, the whole party was gathered at the North Col with twenty-six Sherpas.

Everything that had been left there in 1936 had disappeared. Six weeks after the departure of Ruttledge's expedition, the porters from Solo Khumbu had reclimbed the col and taken away some hundreds of pounds' worth of material! On the 30th May, Tilman pushed on to 24,600 ft., but it was still too early, he thought, to establish Camp V: they were sinking into snow above the knees. Changing tactics, a feint was made of retreating and attacking the North Col by the western face, which the 1936 expedition had not succeeded in doing. On the 5th June the whole party arrived at the North Col from that side—which, in short, is quite as dangerous as the other and more difficult. From there, still by the same classic itinerary, they installed Camp V at about 26,000 ft., then Camp VI at about 27,200 ft. It was from the latter that on the 9th June Shipton and Smythe made their supreme attack, which failed at about 27,250 ft. because of the powder-snow into which they sank up to the hips. On the 11th June, Tilman and Lloyd were no more fortunate. Only Lloyd made use of oxygen and found it did him much good. The final retreat was made by the east slope of the North Col, the col thus being traversed for the first time. Tilman ends his story by acknowledging that the weather still remains the principal and decisive factor, and that, in order to triumph, perfect conditions on the last 2000 ft. are essential. He confesses that his party did not go to Everest as if for war (an allusion to the German expeditions to Kangchenjunga and Nanga Parbat) but for pleasure, and that they preferred being defeated to being killed. Is this a way of explaining or excusing the rather weak and slow pace of the operations?

While passing in review all the photographs taken in this range during the years 1921–38, one is struck by the lunar relief of these Tibetan mountains, worn, smoothed, polished, monotonous. They seem easy in comparison with alpine peaks. It is difficult to imagine how they can place any technical difficulties in the way of a well-trained party. What a contrast with the views of the Nepalese face, where the rocks rise up in gigantic walls! If men have not been able to triumph on the Tibetan route, quite natural and progressive, what chances would they have of conquering the Nepalese face? That is the objection which quite naturally comes to mind.

But let us continue our history. In the Spring of 1939, the political situation was too strained to permit an Everest expedition and the British seemed little inclined to launch a new attack. Moreover, the principal pioneers were occupied elsewhere: Shipton in the Karakoram, Tilman in Assam, Smythe in the Alps. The war supervened, and throughout that war Everest remained alone in its splendid isolation. Down below men were killing each other and had no time to raise their eyes to the mountains.

Nevertheless, in the spring of 1942 its walls must have echoed the trembling sound of a solitary airplane. But what was the throb of a motor to the Aeolian goddess Chomolunma? Scarcely the hum of a mosquito upon the skin of an elephant! In this military plane was one man, an American colonel named Robert L. Scott, who dared to face the ether at 25,000 ft. In the early dawn at Kutch Bihar, without authority or preparation, in a plane which he was piloting for the first time, he set out on this mad adventure. Flying over the Terai, the forest belt which surrounds the feet of the Himalayas, he rapidly gained height and aimed for Kangchenjunga as the only known landmark in the immense surge of confused peaks. He circled its spires, photographed it, and then plunged towards Everest, which he recognised by its characteristic white plume. Skimming past Makalu and avoiding Lhotse, he photographed the goddess at point blank and flew over the roof of the world, which seemed to him like a little island of greyish rocks. Opening a window he took a breath of Everest air, which sent the thermometer on board to twenty-two degrees below zero. The oil coagulated. He descended, then rose once more and touched 11,300 m. (over 37,000 ft.). No echo came back to him of the roar of the engines. He was alone in infinite space. But the effects of the altitude made themselves felt and forced him to fly lower. A big curve took him back towards Everest, which he flew over a second time. Finally he returned to his point of departure. Instead of congratulations, he was punished for having flown over Nepalese and Tibetan territory without authority—such was the reward of the hero who had defied the Himalayan demons! Scott, a worthy emulator of him of the South Pole, claimed to have taken quantities of photographs, even in colour, but nothing seems to have appeared on this mad adventure a strange lacuna in the history of Everest.

Seven years of war passed across the immaculate face of the Aeolian Goddess... For her, nothing had changed. But down below, in the depths of the Indian plains, and even quite close to the high Tibetan plateaus, men were beginning the struggle again.

Hitherto the British had jealously kept the conquest of the Third Pole for themselves, to the exclusion of all other nations. The struggle was not free as was that for the real poles in former times. Everyone would doubtless have applauded a British triumph. None would have merited the victory more than Mallory, who was devoted body and soul to this great problem. But the struggle had lasted too long, the siege had dragged out too far. One day the reaction was bound to develop. Today the whole situation has been reversed. The British have had to free India; Nepal has opened her doors. Tibet has fallen under the thumb of Communism; invaded by the Chinese, it is the Soviets who will benefit eventually by this new situation.

Already in the spring of 1950 the rumour ran in Kalimpong (just opposite Darjeeling) that the Russians were going to checkmate the Queen (naturally they did not mention the name "Everest"). This news filtered through from Tibet, carried by the muleteers of the Trade Route (the commercial route from Lhasa to Kalimpong, created by the British in 1905). The attack should take place the very same year by parties trained in the Pamirs and the Caucasus. Many readers must have been surprised. Russians? Nonsense! But those who had followed the triumphant march of Soviet explorers in Asia could gain some idea of what a Russian expedition to Everest would be. Now only Chomolunma could tremble! No further need of the Dalai Lama's authority! The Chinese held Lhasa. At present, only the Russians are able to resume the easiest and most natural route to the summit of the world, and with all the trump cards in their hands.

Before changing front, it remains to speak of two solitary and clandestine attempts whose authors naturally passed for *illuminati*, but whose motives have not been studied sufficiently to be explainable. The first made his attempt in 1934. He was a former captain in the British army, a certain Maurice Wilson, who had come to Calcutta in a secondhand plane, claiming that he wished to land on the side of Everest in order to complete its ascent on foot and plant the Union Jack at the summit. Every authorisation was refused him and he was warned against the consequences of a violation of territory. That was no obstacle! He sold his airplane and went to establish himself in the Darjeeling neighbourhood, where he spent the whole winter, living like a native and training himself on a sober and severe régime.

At the end of March 1934, disguised as a Tibetan, he crossed the frontier with three Sherpas and followed the usual approach route of the British expeditions. His baggage was carried on the back of a single pony. In ten days less than generally required, he reached the Rongbuk monastery on the 18th April. After a preliminary reconnaissance, he left Rongbuk at the beginning of May with only two porters; the third was suffering from dysentry. The ascent was slow and progressive as far as Camp III (21,000 ft.). The weather seemed favourable, but the coolies had probably never taken their sahib's plans seriously. When the latter wished to proceed towards the North Col (22,990 ft.), they raised numerous objections. Seeing then that he could count on them no longer, Wilson decided to go on alone. He left them some letters and begged them to wait for a fortnight. It was probably on the 17th May that he set out for the supreme ascent.

The porters waited a month at Camp III and then, as they had reached the end of their provisions and had lost all hope, they took the return road and came back to Darjeeling.

Can one speak of suicide? Wilson was the victim of his optimism and his dream. The extraordinary thing, and one which cast a shadow over his porters, was that his body was found the following year by Shipton's expedition quite close to Camp III. His death seems to have been due to exhaustion and cold more than to hunger: he had discovered a provision depot left by the 1933 expedition.

Had he died in his tent and the tent been carried off by the wind? The two porters who had waited for him in vain were, moreover, in Shipton's expedition and might have been able to give some explanation. According to the diary found on his body, Wilson had not reached the North Col, although he had attempted it several times... It would be very interesting if this diary were published.

Denman's solitary adventure in 1947 is less macabre, but even more rapid. Earl Denman, a Canadian living in Johannesburg, must have been a strong-minded person and known what he wanted. The account of his exploits was given verbally by his leading Sherpa (Tensing Bhotia) to Prof. Krenek at Darjeeling and was published in Volume V of *Berge der Welt.* It does not agree in every respect with that published by Denman in *Appalachia* for June 1951. As the author is editor of *African Wild Life*, it is probable that he would have known how to embroider his story. According to Tensing, accompanied by Ang Dawa, they had left Gangtok, capital of Sikkim, at the beginning of April 1947, Denman being disguised as a Tibetan. Crossing the Sebu La they quickened all their stages so as to arrive at Rongbuk at the end of April. The snow conditions were excellent (much better than in 1936 and 1938) and the North Col *Bergschrund* was completely choked. After a night on the pass they had to give up because of the intense cold and inadequate equipment. The return from Rongbuk to Darjeeling was done by ponies in only ten days, marching day and night because Denman was so fearful of being arrested. The entire expedition cost him only £ 250.

According to Denman (*Appalachia*, XXVIII, 369–379) the departure from Darjeeling took place on the 22nd March via Gangtok and the Kongra La (16,840 ft.), next to the Sebu La. The author let his beard grow and allowed himself to pass as an American missionary. The first Tibetan village was called Gombolo, a name which cannot be found on the maps and is not in the least Tibetan. Denman complains of the well-known dirtiness of the natives, of the impossible temper of the yaks, which decimated his baggage, and of the ferocity of the Tibetan dogs. To avoid the large villages, he seems to have passed through Sar, north of Tashirak, and Tranak (which he writes Tarnak). Having arrived at Rongbuk, he left it on the 10th April. The whole mountain was clear of snow, black from top to bottom, except for the white plume raised by the north-west wind and smoking against an immensely blue sky. The streaks of the yellow band were perfectly clear, cut by a single couloir (the famous "great couloir"). Denman states that he lacked foodstuffs and warm enough equipment. He had no sleeping-bag and no oxygen. He seems to have suffered terribly from the cold, especially at night, horrible sleepness nights, much too long for his liking. No one had ventured into these localities since 1938, but certain vestiges of earlier expeditions revealed the sites of the British camps. Denman's own camps were only separated by short distances, probably because of the enormous loads which the two Sherpas had to carry. There were no less than three in front of the East Rongbuk Glacier, which was entirely uncovered and very slippery. It was there that he established his Camp IV in a terrible gale. The following day the caravan set out for the North Col (22,990 ft.), but the cold became so terrible that they had to beat a retreat without having reached the col. The author claims to have reached about 23,500 ft., which is clearly impossible; probably it is a printer's error for 22,500 ft. The fine weather did not last much longer and this was a consolation for Denman, who seemed to be a great idealist. On the 28th April he reentered Darjeeling after an absence of only five weeks—a record which would be difficult to beat. The author asserts that he returned to Darjeeling the following year (1948), much better equipped and provided with sufficient money, but found no one disposed to accompany him.

Since Tibet remains closed henceforth to "western capitalists", the hopes of the climbers have turned quite naturally to the south face of Everest and to Nepal in general. This change of front has not been quite so abrupt as one might think, for Nepal had opened her gates well before Tibet had closed hers. The Orient did not share European nervousness, and some time even had to pass before climbers decided to profit by this unexpected windfall. The British and the Americans were of course the first to make a request to Katmandu. Authorisation was granted almost simultaneously in 1949 to an American mission, mainly consisting of botanists and to the British explorers Tilman and Lloyd for a reconnaissance of the Langtang Himalaya, directly north of Katmandu. The following year (1950) saw no less than three expeditions to Nepal, of which, it is true, only one concerned Everest itself. They were: the lightning party of Frenchmen which triumphed on Annapurna (the first 8000-metre peak to fall); the British climbers Tilman and Lloyd, who explored the sources and basin of the Marsyandi contained between Manaslu and Annapurna, but which did not get beyond 24,000 ft.; and finally, Houston's American party which confined itself to an autumn reconnaissance in the valleys north of Namche Bazar.

Seeing the Russo-American competition, the British themselves woke up, seeking to pursue their last chances. In August 1951 Shipton raised the standard in his turn and achieved an extremely fine exploration of the Nepalese slopes and the access routes to Everest. His expedition is still in everyone's memory. It therefore only remains for us to speak of the last two undertakings.

Dr. Oscar Houston of New York had long wanted to visit Nepal, but permission was not given him until late in 1950. His son Charles, who had so brilliantly directed the 1938 attack on K2, was more interested in Everest than in Nepal itself.

It was at Jogbani, the terminus of the Indian railway on the southern frontier of Nepal, that the Houston expedition assembled at the end of October 1950. The

Houstons and Mrs. Cowles came from Katmandu, where they had been staying for a month as guests of the Maharaja. Tilman returned from his exploration of the sources of the Marsyandi. The Reverend Anderson Bakewell (an influential member of the American Geographical Society) came down from Kurseong, near Darjeeling, where he had been living since 1947; he was bringing with him the famous Sherpas Gyalgen, Pa Norbu, Da Namgyal, Sarki and Dickye, the latter's wife, who would take the caravan to Namche Bazar.

The expedition had only thirty-six days in which to reconnoitre Everest and return, and the days were already short.

From Jogbani nearly four miles of motor-road lead to Biratnagar, the principal industrial centre of Nepal and the expedition's effective starting point. On the 30th October, as quickly as the bad roads allowed, it crossed the region of the Terai, which is infested with swamp fevers: forty miles in eight hours. Very far off and very high in the sky, one hundred and twenty miles to the north-west, the Everest range glittered in the first rays of the sun. At Dharan Bazar, at about midday, they reached the foot of the hills. They had to exchange the car for saddle ponies and about fifteen porters for transporting the baggage. A pass of 4000 ft. leads into the valley of the Tamur, a river which issues from the snow of Kangchenjunga and which drains the whole north-east corner of Nepal. This is crossed by a bridge of cables, leading to Dhankuta, a charming little town of 4000 inhabitants, with its houses dotted along a ridge; it is the seat of the district governor, who consented to give the travellers a permanent military escort.

In the next valley, that of the Arun, a landslide forced them to send their ponies back and to continue the journey on foot. In the afternoon this valley is very warm, but delicious oranges are found there to quench one's thirst. It was ascended for three days. Beyond the Arun, no white man had ever ventured in the direction of Everest—and with reason! They left this valley by a western tributary, the Irkhua Khola, which leads to Phedi. (The itinerary, differently described by four different persons, is difficult to follow on the map, even the quarter-inch map of 1930. It looks as if it might have been shorter to go by way of Dingla.) Thence, three passes higher than 10,000 ft. (including the Salpa La, 11,810 ft.) led them into the valley of the Dudh Kosi, after crossing two transverse valleys (of Hongu and Inukhu). The long crossing of these passes daunted the porters; they deserted and placed the caravan in the greatest embarrassment, for they were very difficult, if not impossible, to replace.

The Hindu temples had gradually given way to the Buddhist *gompas*, and the villages were now peopled by Sherpas of Tibetan origin. The clear waters of the Dudh Kosi descend straight from Everest; by ascending their course, the expedition arrived at Namche Bazar (11,320 ft.) on the 14th November; it has thirty houses and four hundred inhabitants, is the home of the famous "Tigers" and an important point for barter between Nepal and Tibet (Indian rice for Tibetan salt). The caravan was received with all the honours due to its rank, for these white ambassadors were the first to penetrate the region.

A snowfall momentarily interrupted the splendid succession of fine autumn days. After a cold night the sky cleared and the caravan ascended a further six miles to the monastery of Thyangboche, a charming little replica of the celebrated monastery of Rongbuk, on the opposite side. Thyangboche is visible from afar, situated on a saddle, partly grassed and partly wooded with pine and birch, in a much more rustic and friendly region than that of Rongbuk, overlooking the confluence of the Imyia Khola and the Dudh Kosi. It brings to mind a vision of the famous Shangri La, the last oasis of peace in a troubled world. A number of extraordinary summits rise up round, defying the heavens with their formidable *aiguilles*, among them the Ama Dablam (22,300 ft.), which vaguely reminds one of the Mustagh Tower in the Karakoram. As to Everest itself, it is almost completely masked by the formidable curtain stretching from Lhotse to Nuptse and makes no impression: one can only detect the extreme summit, recognisable by its white plume.

At the monastery the expedition split up. Charles Houston and Tilman, with four Sherpas and provisions for only six days, left on the 16th November to reconnoitre the access routes via the Khumbu Glacier. Throughout this reconnaissance the weather remained perfectly clear but very cold. At first it was necessary to ascend the course of the Imyia Khola for three or four miles, in order to reach the point where the valley divides. They passed by the convent of Pangboche, left that of Dingboche on the right and took the valley known as Lobuyia Khola, on the left. They then reached a wide sandy plain, the former bed of a now dried-up lake. This plain is encircled by immense moraines. Having towards midday reached the alpage of Phalong (14,100 ft.), they set up camp in a hut and left on reconnaissance of the slopes on the north-west side to try and obtain a view of Everest—but without success: they were still too low. Above Dingboche there rose a summit which seemed absolutely inaccessible and which they named "Matterhorn", because of its resemblance to that mountain (though we have found none; later they would identify it with the Tamusurmu, 21,000 ft., a cathedral of ice). And as its counterpart, on the other side of the valley (to the west), the Taweche (21,390 ft.) seemed quite as formidable.

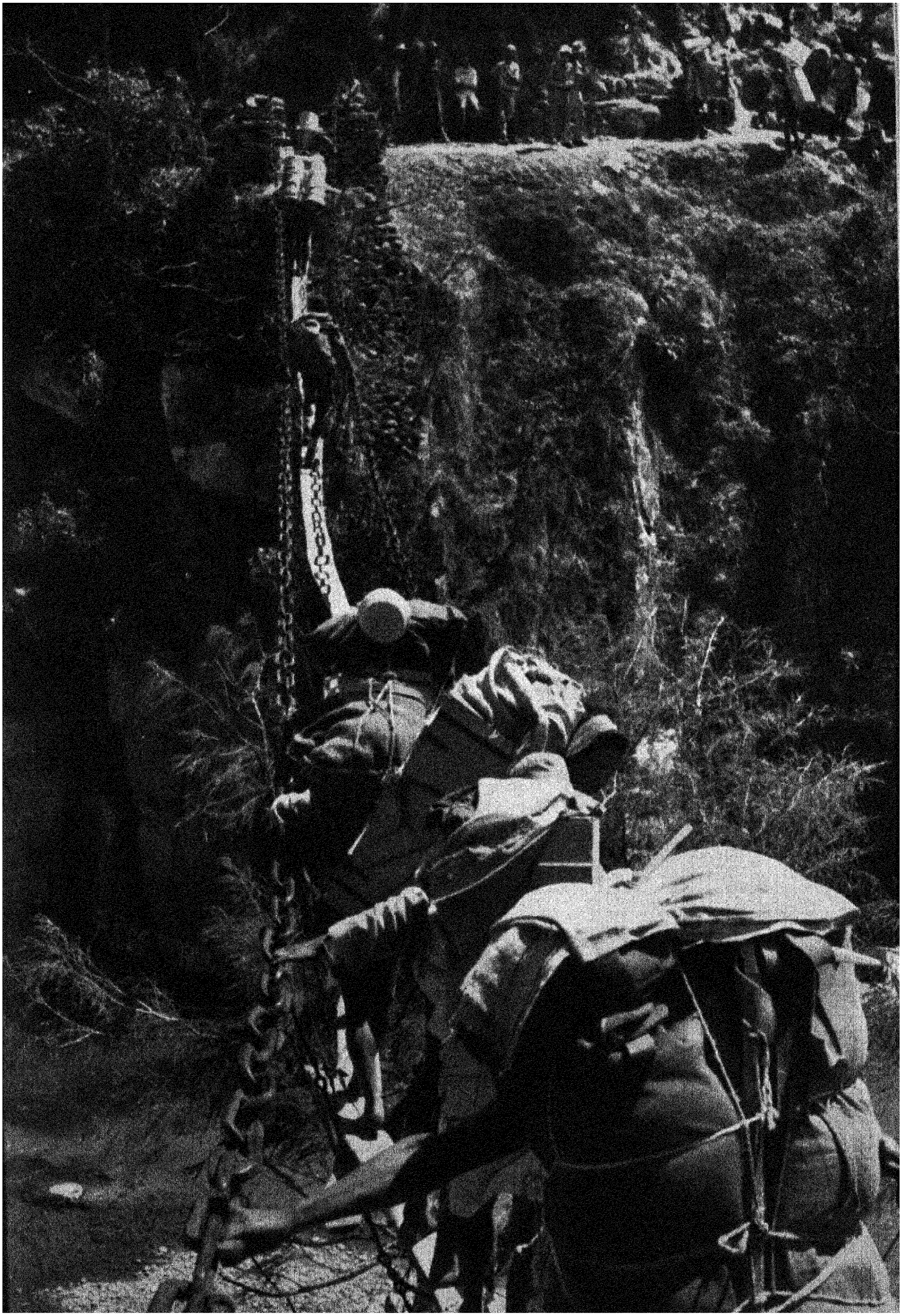
The following day they at last reached the Khumbu Glacier and verified that it was in full retreat. Houston estimated its length at 15 km. (about 9½ miles) to the foot of the Lho La, which is far from agreeing with the best existing map (*Everest and Environs*, 1930). They camped a little above the outflow, about four miles from Phalong. During the afternoon they ascended the moraine-covered glacier in the hope of being able at last to discover the famous Western

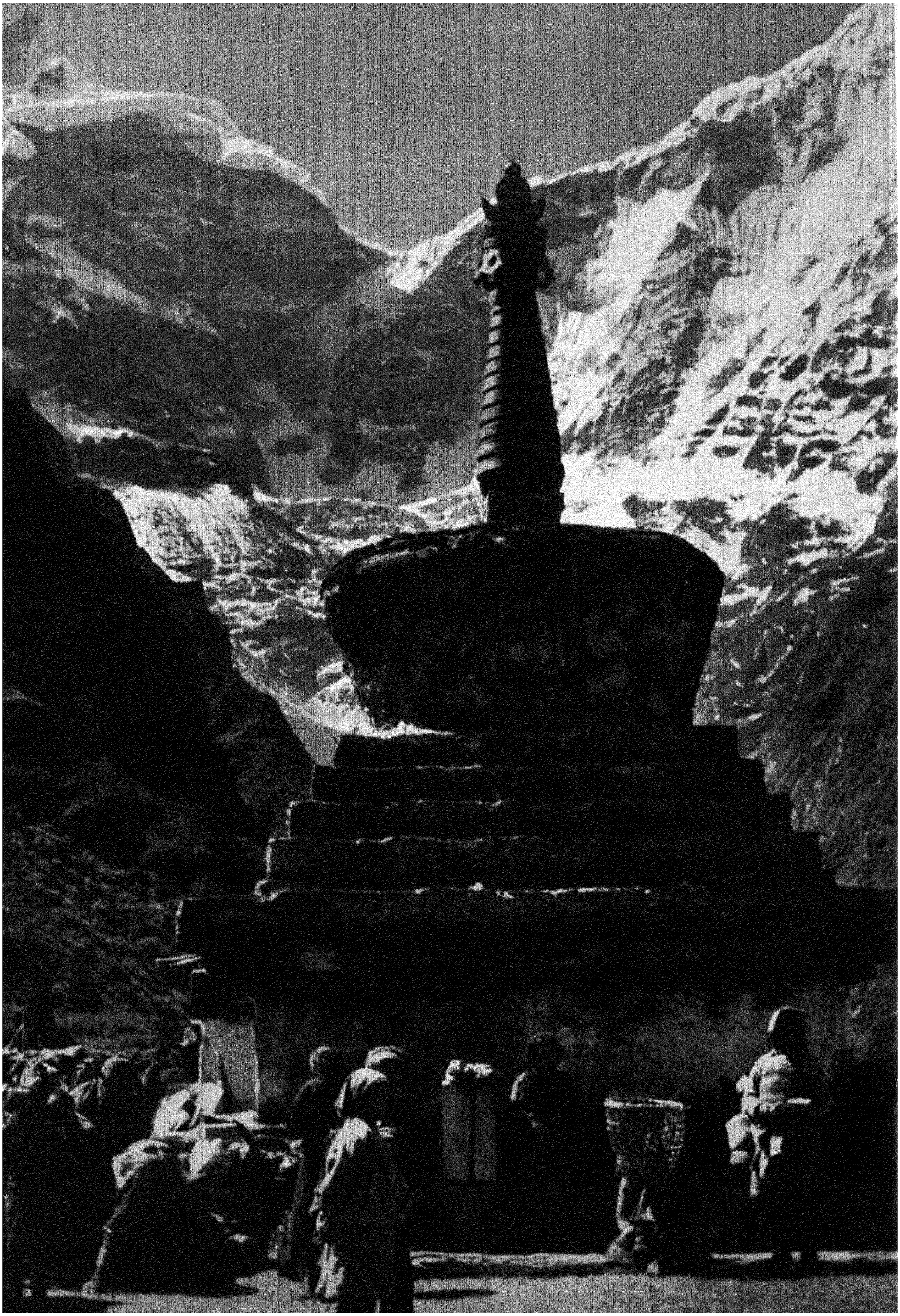
Cwm, still hidden by the buttresses of Nuptse. Four miles above the glacier tongue the moraine covering lessened and long bands of white ice appeared, bristling with immense needles (half-pinnacles, half-séracs) after the manner of those of Rongbuk. Some of these needles were up to 100 ft. in height.

But the Western Cwm still remained invisible and at nightfall the two explorers returned to camp exhausted. The next day, 19th November, they sent their Sherpas back to Phalong and took once more to the glacier and its moraines. On the western bank they progressed more easily and made towards Pumori (23,196 ft.), which was thus named by Mallory in honour of his daughter *(Pumo* = daughter). Towards noon they halted on the southern slopes of this summit at about 19,000 ft. The Lho La was perfectly visible two miles north-east. It appeared difficult and dangerous because of the frequent avalanches which broke loose from it. By this pass and the West Rongbuk Glacier one could rejoin the North Col and the usual Tibetan route, but this is an immense detour. Everest itself seemed very dry and well cleared by the west winds. The clearly visible "Yellow Band" stretched right across the southern wall and the rocks of the south-south-east ridge overlapped in a favourable manner. Of the Western Cwm only the lower part could be seen, full of séracs and very much crevassed between two impracticable walls. The photographs taken in 1921 had already represented it as a solidified Niagara. So Houston confirmed Mallory's opinion that it was very difficult if not impossible—in any case it is not a reasonable route for climbing Everest. And Tilman went further: If the best climbers in the world have failed on the Tibetan route, he asked, who then will succeed on an even more difficult itinerary? Having established these facts, the two experts turned their backs on the mountain and returned to Thyangboche. Meanwhile, Bakewell had made active reconnaissances in the neighbourhood and obtained numerous and magnificent photographs. On the 4th December the expedition returned to Biratnagar, exactly thirty-four days after its departure.

Houston ends on an almost optimistic note. The Nepalese route offers certain advantages over the Tibetan route: it is short (fifteen days to base); it crosses a fertile and populous region, where one is not exposed to winds and to the dust of the high Tibetan plateaus and to the various illnesses they engender; but the upper valleys are not viable except before or shortly after the monsoon, because rivers are swollen during the rainy season (this seems a little theoretical). A comfortable base could be set up at Phalong (14,100 ft.), easy to provision from Namche

Plate 3: Footbridge suspended from chains across the gorges of the Sun Kosi, key crossing in the trade route between eastern Nepal and the capital. The river has its source in Tibet and traverses the Himalayan chain; when the snows are melting and during the monsoon, it would be impassable without this suspension bridge.





(11,320 ft.) or by airplane (one might eventually land on the dried-up lake). The advanced base could be placed on the western bank of Khumbu Glacier. Houston is convinced that the best season for attempting Everest is the month of November, as soon as the weather is settled.

Tilman, on the other hand, is pessimistic: the monsoon would be as violent as in Sikkim, which is confirmed by the abundance of lichens (the Indian meteorological service has, however, installed a rain-gauge at Namche and the rainfall is now easy to check). The glaciers are remarkably small. He reckons the length of the Khumbu to be about six miles. He maintains that the Nepalese approach route is only a week less in length than that on the Tibetan side (!), and that instead of mules or yaks numerous porters would be necessary, difficult to feed in so poor a region; that the dust of Tibet is less terrible than the malaria of Nepal and that the abrupt rise on this side is not a progressive training for the sahibs. Between these two divergent opinions it would be wise to take a fair mean.

If we want to follow chronology, we must insert here, between the autumn expeditions of Houston (1950) and Shipton (1951) a spring attempt, solitary and clandestine—the third!—which passed quite unnoticed in Europe, but of which we have been informed by Prof. Krenek of Darjeeling. This time it was a Dane named R. B. Larsen. We know nothing about him, neither what his plans of approach were, nor whether he had asked for proper authorisation from Nepal. This did not in any case arrive in time.

He left Darjeeling on the 31st March 1951 with four Sherpas. At Sandakphu (the Sikkim-Nepal frontier) three more Sherpas came to join his caravan—very light, moreover, and living on the country, without superfluous baggage and with barely adequate equipment. The caravan took the shortest possible route over mountains and valleys, via Taplejung (in the Tambur valley) and Chainpur to Dingla on the Arun, where it joined the official route from Jogbani to Dhankuta. Then from Dingla it went over the passes into the Dudh Kosi valley, which it ascended to Namche Bazar, arriving there on the 22nd April, twenty-three days after leaving Darjeeling. At Namche, Larsen found the glacier ropes left behind by Houston and was able also to replenish his provisions. Like his predecessors, he ascended the valley called Lobuyia Khola, but was discouraged by the deep snow and by avalanches before even arriving within sight of the Western Cwm. He was, perhaps, simply aiming at the Lho La (*c.* 20,000 ft.) but this no longer seemed to him attractive and he finally returned to Namche.

Changing tactics and still without a passport, he then went up the valley which opens to the left (north-west), that of the Bhote Kosi, in order to cross the Nangpa

Plate 4: Buddhist chorten in front of the Thyangboche monastery, which stands between Namche Bazar and the upper valleys of Everest. In the background, Kangtega (22,180 ft.).

La (19,050 ft.), an easy pass crossed by the yak caravans in September and October. But at the beginning of May this pass was still very deep in snow and gave him much trouble. Thus he arrived at Kietrak (15,300 ft.), the first Tibetan village. Avoiding the Tingri fort, he made direct for Rongbuk, which he reached in six days of forced march from Namche. The Baralama was very friendly towards him and even protected him from the Tibetan police. From Rongbuk he reached Camp III and stayed there four days until all his loads had arrived.

On the 7th May he at last attacked the North Col (22,990 ft.). Conditions were perfect, except for a diabolical and naturally icy wind which penetrated everything. As the sleeping-bags were defective and he had not even a Primus for cooking, the Sherpas refused to camp on the col and went down at once, despite the objurgations and promises of Larsen, who never forgave them their desertion.

This third clandestine attempt upon Everest therefore failed at the same point as its two precendents. The porters knew it in advance and no doubt contributed to it, for they detest exposing themselves to frostbite "uselessly". Even though they had been handsomely paid, their conduct this time had not been brilliant.

The return to Namche Bazar was made by the same route and the Sherpas will no doubt remember Larsen's forced marches for a long time. This combination of the Nepalese approach route with the normal itinerary of the Tibetan side of Everest is interesting and deserves to be singled out, for this is certainly the first time that it has been carried out by a white man (we have seen that in April 1938, forty-five Nepalese porters joined the Tilman expedition at Rongbuk by crossing this same Nangpa La with 600 kilos of provisions). It is naturally an enormous detour in order to fall finally into forbidden territory. It would have been preferable to try the crossing of the Lho La, although it seems much more difficult.

It is curious to note that, in his story, Shipton now seems to want to discredit the normal Tibetan route to the benefit of the projected route through the Western Cwm—above all because of the terrible north-west winds. These northerly tempests hardly cease except at the end of May, just before the monsoon. At that moment a short period of fine and still weather can develop, but it is a thin chance by which one has only benefitted twice, in June 1924 and 1935.

NORTH TO EVEREST

By Elizabeth S. Cowles

For many years mountaineers wondered about the south face of Mount Everest: what it looked like, if it was climbable, and whether an expedition coming up through Nepal instead of Tibet would have a better chance of success. Unfortunately, there was no way of finding out the answers to these questions so long as the tiny mountain kingdom of Nepal continued to forbid foreigners to enter its borders. The world's highest peak could only be approached from the north, and luck persistently ran against the British in their five courageous attempts to scale it from that side.

A few years ago, however, the political situation in the Himalayan area completely changed. The Chinese invasion closed off Tibet entirely and the Nepalese, awaking to the dangers of their isolated position, began to lift travel restrictions a little. Among the first to benefit from the new policy was a fortunate group headed by Oscar R. Houston of New York. With his son, Charles S. Houston, H. W. Tilman, Anderson Bakewell and myself, he was given permission by the Maharajah to visit eastern Nepal. The Houston plan was to follow native trails northward to Mount Everest and the hope was to be able to discover whether a feasible climbing route existed on this side.

The expedition assembled on October 30, 1950, at Dharan, a small lowland town on the edge of the Terai, from which a rough track led northward into the foothills. Small by usual expedition standards, we nevertheless looked like quite an army as we started off: five Sahibs, five Sherpa porters, eighteen coolies carrying the gear, a soldier escort, and any number of other people tagging along to watch the fun. That night we camped on a beautiful knoll overlooking the Tamur valley, with its blue-green hills around and the Himalaya in white array along the northern skyline. Chamlang, Makalu and Kanchenjunga were wonderful to see in the changing lights of afternoon and evening, but there was no sign whatever of Everest, then or for a long long time. The monarch among mountains has an extraordinarily retiring disposition, we were to discover. Not a glimpse did we have of him until seventeen days later, some 125 miles further on.

Our route lay over five great ridges, across six rivers, and led always up and down, up and down. We crossed the Tamur on the 31st and climbed to Dhankuta, a trim and delightful town nestled in flowering shrubs. Then on over a high ridge and down to the Arun river. We followed the Arun for three days, crossing it at Kattege-Ghat in a dug-out canoe. Then we struck across fertile terraced hillsides to the Irkua river and proceeded upstream to Phedi, a small settlement below the 12,000 ft. Salpa La, gateway to the high country beyond. Problems of food and transport threatened to halt us here but the caravan luckily kept going and we were safely over the pass on November 8. A long descent followed through moss-hung forests of holly and rhododendron to the lively waters of the Hongu river, which we crossed on one of the sensational Nepalese bridges made of a few wobbly bamboo logs bound casually together. The ups and downs continued. A two day climb took us past Bung and over rocky slopes to the next pass; then we had another long descent to the rugged gorge of the Innukhu khola. The ridge beyond the Innukhu was the last obstacle remaining between us and the Everest watershed. The country ahead was very grand and wild, with lofty peaks on every hand and the Dudh Kosi river a narrow silver thread in its deep-cut valley far below.

On November 14 we reached Namche Bazar, a sturdily-built Sherpa village that was hometown to several of our porters and extremely kind and hospitable to us, its first visitors from the western world. At Namche, we knew that Everest was very near—but where? When we climbed a high knoll behind the town to look for it, the clouds had dropped down like a curtain and we could see nothing.

The next morning it was snowing. We trudged along the rocky side-hill path towards Thyangboche with only a hint now and then of high crags overhead and the Dudh Kosi in its wild gorge far below us. The plan was for Charles Houston and Tilman, the strongest and most experienced of the party, to press on towards the mountain that same day, taking two of the Sherpas along and a couple of husky hill men to carry for them. The trip in had proved longer than we had expected and only five days were left to reconnoitre the peak. We all felt that these two were the ones to do the job and only hoped that they would have time enough to accomplish something. The storm was a serious worry. If it meant a real break in the weather, we faced complete failure. That afternoon the scouting party went on up the valley and the rest of us settled down in a small house at the Buddhist lamassery of Thyangboche to await their return. It was still snowing.

But the next morning—what a transformation! We awoke to a glorious day and to a scene so beautiful as scarcely to be believed. Ten miles or so up the valley was Mount Everest, vast and unmistakable, its bulk outlined against the deep blue sky. The satellites, Nuptse and Lhotse, were right in front, taking away something of the grandeur of its identity but adding strength and solidity to the great structure. Nuptse's black ridge cut across the face like a fortress wall and then rose to join the lofty spire of Lhotse on the right. The tremendous precipices, amazingly free of snow, filled massively the whole V of the valley before us. But this was not all. On every hand there were line upon line of dazzling peaks, with the fluted ice-faces, the delicate ridges and tapered summits so characteristic of the Himalaya. Below them, the picturesque buildings of the lamasery hugged closely the sides of its wonderfully situated little knoll. Yesterday's snow lay everywhere on the ground and the lamas made bright accents against it as, young and old, they went about their business dressed in their bulky red woollen gowns.

Our days at the lamassery were a delight, the beauty of the scene around us and the warm happy spirit of the place itself combining to make our stay there something never to be forgotten. The little lamas were just like youngsters anywhere, bright, lively and inclined to mischief. The older lamas had sweet peaceful faces and treated the younger ones with the greatest warmth and affection. All showed every kindness and consideration to us and were completely fascinated by everything we did, said, ate and wore. The head lama, a young man of about sixteen, received us and we sipped Tibetan tea together in a ceremony in which chanting featured and a strange sort of rhytmic music from horns, cymbals, bells and drums. One day we were invited to watch some of the lamassery dances, held in the sunny open courtyard. The dancers wore high gilt headdresses and their colourful skirts swung out beautifully in the bending and turning pattern of the dance. Most of our time was spent out of doors, taking endless pictures and looking at the scene about us in wonder and in awe. We watched Everest in all moods and at all times of day, always deeply stirred to think that here before us was the point of all the earth's surface reaching farthest into the sky, a matchless sight that we, in incredible good fortune, were the first travelers from the outside world to see from this spot. Each evening was especially memorable for, after the sun had set, the great rock face would go on blazing away long after the rest of the mountain world was in darkness around us.

On November 19 our friends returned. To the big question in all our minds: is there a good climbing route on this side?—the answer appeared to be a disappointing no. They had looked things over as thoroughly as time and the lay of the land permitted. It became immediately apparent, to begin with, that the formidable precipices of Nuptse and Lhotse completely blocked the mountain to direct attack from the south. Their next move was to work north-west up the Khumbu valley to see if a breach in the defences lay beyond the end of Nuptse. The going was very arduous. Rapidly retreating glaciation was everywhere apparent. Masses of rock, once ice-encased, now hung in delicate balance. Beyond Nuptse a tangled confusion of ridges, precipices, ice-falls and gullies revealed itself and no promising line could be seen by which the south ridge of the peak could be gained. Going further up the Khumbu, Tilman and Houston climbed to 19,000 ft. on the slopes of Pumori. Their best view of Everest was from this point. The north-east ridge, route of the British attempts, lay along the left skyline; the south arête, on the right, dropped steeply towards the col between it and Lhotse. Unfortunately, there was not time to go far enough for an unobstructed view up the steep channel leading to the Western Cwm, that basin below the South Col into which Mallory had looked in 1921 and pronounced impracticable. Only the lower quarter of the ice-fall was visible to the two men, and its formidable appearance led them to rule it out as a feasible route. Two other possibilities occurred to them: the first, of trying to attain the Lho La from this side, which would offer access to the North Col and the traditional line of attack of other years; the second, that the western shoulder of Everest might be attainable from the mouth of the Western Cwm and a way to the summit opened from there. After considerable examination and speculation, our friends concluded that neither of these alternatives appeared to be promising. Even if a way might be forced by great skill and perseverence in any of these suggested directions, there would always be the matter of laden porters to consider, and the placing of a chain of camps. Their feeling was that if a relatively straight-forward route on the other side of the peak had been too much for some of the world's best climbers, it would hardly be reasonable to suppose that a way more difficult and dangerous over here would present much promise for the conquest of the mountain.

(It is interesting, two years later, to survey these conclusions of necessity so hastily arrived at. The ice-fall leading to the Western Cwm has since been proved by three expeditions to be no less difficult and dangerous than it looked to be in 1950. The fact is that the route into the Western Cwm that has been followed by the British and Swiss expeditions of 1951 and 1952 was chosen not because it was a good route but because it was the *only* one.)

When the Houston expedition broke up on December 5 at Chatra, we were not long in learning of the abysmal turn that world events had taken in our absence: of the revolution in Nepal and the serious reverses suffered by United Nations forces in Korea. Against the dark and troubled background of the uneasy times in which we live, our days in eastern Nepal remain a happy memory towards which our thoughts constantly return in joy and gratitude, and with the eye of the mind we shall often look again on the peaceful lamasery of Thyangboche in the shadow of its great mountain.

EVENTS LEADING UP TO AND PREPARATIONS FOR THE 1952 MOUNT EVEREST EXPEDITION

By Ernst Feuz

In 1922, as a Christmas present, Dr. Kurt Wehrlin gave my father, who was a guide, his book on the 1921 exploratory expedition to Mount Everest. I was then fourteen and laid my own books aside to devour it. When, later on, I saw Andrew Irvine skiing at Mürren, I read the book on the following expeditions also. After a long stay abroad, I formed the resolve to reach Mount Everest myself. In this connection I should name several persons who, during some decades, have assisted me and the Swiss Foundation for Alpine Research in this venture.

In 1935 Robert Strüby, using the surveys then available, drew maps for me indicating the approaches by plane to the Rongbuk Glacier. Othmar Gurtner and I made a serious attempt to approach the closed kingdom of Nepal. This was by way of trade through the United States, Mrs. Wade Martin of Washington D.C., correspondent of our Foundation, proposing that, simultaneously with a substantial purchase of rice, permission should be sought for an expedition into the closed kingdom of Nepal and to Mount Everest.

One of the first to establish and maintain Swiss contact with Nepal was Martin Hürlimann, who as early as 1931 made us more familiar with the idea of Nepal in his *Atlantis* by his description of a journey into this kingdom. The National Geographical Society of Washington published a similar article by him.

We still did not know how we could approach the Dalai Lama for permission to enter Tibet, especially since he had so far granted such permission only to British expeditions; the response from the State Department, when asking its support for our plan, was unsatisfactory and Robert Strüby's attractive sketches had to be laid aside.

When this scheme had failed, we had to have recourse to action. We owe it to Karl Weber, now President of our Foundation, and to his enthusiasm, that in 1939 we were enabled to send a small expedition to the Garhwal Himalayas. The first step towards acquiring experience had been taken, the Foundation was inaugurated, and even the war did not hinder the progress of our efforts.

In 1940 Hugh Ruttledge came to Switzerland to lecture on his Everest expeditions. As I was then on military service, Dr. Walter Amstutz saw him, and he wrote to me as follows on 15th February 1940. "I have discussed at length with Mr. Ruttledge the question of an Everest expedition. I have the impression that he would not be averse from supporting a Swiss expedition; moreover he believes that even during the war permission would be granted. But he said that this would take a great deal of time, and that application should be made as early as this spring for permission in the summer of 1941."

Amongst the first to hear of this plan was C. G. Duvanel, who immediately offered himself as film operator for such an expedition. Colonel Strutt also, with whom I discussed the Swiss Mount Everest problem in 1939, was definitely of the opinion that it was time for another expedition to visit Mount Everest; however, this would provide a better opportunity for considering comparative achievement.

The following memorandum dated 25th February 1941 of the Swiss Foundation for Alpine Research to Dr. R. Schöpfer, Solothurn, then President of the Foundation, puts forward the case:

"*Swiss Mount Everest Expedition*, 1941. In the course of the London discussions about the 1939 Swiss Himalayan Expedition the problem of Mount Everest was also discussed, and the question was raised whether an American or Swiss expedition should not attempt the ascent of Mount Everest. Prominent members of the Everest Committee and of the Royal Geographical Society observed that they were not averse from others being given the opportunity of climbing the highest mountain. The following are considerations in favour of this proposition:

1. The British sporting instinct will never admit that the Alpine Club holds a sole lease of Mount Everest.
2. Comparison between a British and a foreign (Swiss) expedition to Mount Everest would be interesting and is desirable.
3. Such permission granted by the English to us Swiss would be highly creditable to the Englishman's sense of 'fair play'.
4. We well remember the pioneer work done by the tough, persistent old Englishmen in association with our famous guides, whereby the Alps were conquered and thrown open. Nobody then would have thought of the Matterhorn as a challenge reserved for Englishmen.
5. The friendly feeling between the old mountaineering pioneers of all countries, such as was assumed as general, must be restored.
6. The mountains are an international playground, where the youth of all countries can incite to mutual emulation in a spirit wholly other than that of the contests to achieve the north face ascent of the Eiger.

Against it are the following considerations:

1. The attainment of the summit of Everest calls for only an outstanding physical effort. The mountain has been surveyed and is no longer *terra incognita.* Everest is no longer of interest to the scientist.

2. It appertains to the unwritten code of mountaineering ethics that the first ascent of a mountain be left to whomsoever has already made sacrifices to achieve it.

3. That the Swiss Mount Everest Expedition entails high risk, and the undertaking would cost much money.

I myself am of opinion that it is worth while to climb the highest peak in the world; the deed would always be mentioned in history books, and would redound to the credit of that country whose mountaineers proved the impossible to be possible.

Mr. Weber and I would embark on it, if the Foundation were to decide in principle to support this venturesome undertaking."

The President replied as follows on 9th April:

"*At the present time* to embark on such an undertaking is *wholly* out of the question. The British Empire is fighting for its existence. Who in Britain could sponsor an Everest expedition at such a time? *Sentiment* is decisive, and the heart will beat for the home country, not for an Everest expedition.

Conclusion: We must not loose sight of the idea, but wait."

And so Strüby's air approach plans, whose feasibility had been meticulously examined meanwhile by Captain Walo Hoerning at Dübendorf, were finally pigeonholed.

When the war was over, we first refreshed our experience, and accordingly did not immediately aim at Everest in our first expedition, but at minor objectives in order again to gather the necessary experience. A number of expeditions in various parts of the world, especially in the great range of the Himalayas, led us to decide again to include the highest mountain in our programme, a project upon which we can now venture with responsibility.

When Ella Maillart came to Katmandu, and at the same time in August 1949 Professor Arnold Heim visited Nepal's capital on our behalf, we learned with great surprise and satisfaction that the Nepalese Government and its King proved to be very well disposed to our country. Then Armin Daeniker, Minister at the Swiss Legation in New Delhi, began to take steps to obtain the necessary permission for climbing mountains to the north of Namche Bazar in 1952. Meanwhile no steps were neglected to obtain from the Dalai Lama permission also for approaching the mountain by the classic English route over the tableland of Tibet. In this connection also I should mention Ella Maillart, who put me on the right track and took the first steps herself; they came to nothing, and our approach to the Chinese Government also proved fruitless.

In November 1951 permission was received to explore Mount Everest from the south. The city and the canton of Geneva supported the enterprise with money and the provision of scientific equipment. Most of the members of the climbing party were drawn from the small mountaineering club, "L'Androcace", of Geneva, and I was able to bid farewell to the head of the expedition and the leader of the climbing party as they left with instructions to tackle the Khumbu séracs, the lonely glacier valley at the southern foot of Mount Everest, and if possible to push forward to the Lho La (South Col).

THE STAGES OF THE EVEREST EXPEDITION OF SPRING 1952

1. Journey from Geneva to Katmandu:

March: 13 and 20. Flights from Geneva-Cointrin
14 and 21. Arrivals at Bombay
22. Flight from Bombay and arrival at New Delhi
26. Flight from New Delhi and arrival at Katmandu

2. March from Katmandu to Namche Bazar:

March: 29. Banepa
30. Dolalghat
31. Chyaubas
April: 1. Lichanku
2. Manga Deorali

April: 3. Namdu
4. Yaksa
5. Those
6. Chyangma La
7. Setha

April: 8. Junbesi
9. Taksindhu
10. Kharikhola
11. Puyan
12. Ghat
13. Namche Bazar

(Sketch-map on page 44: outward march shown by the solid line, and the return march by dotted line with the diversion of a group from Okhaldhunga to Katmandu.)

3. Ascent from Namche Bazar to the base camp at the Khumbu Glacier:

April: 16. Thyangboche
17. Pheriche

April: 18. Chukpula
19. Lobuje

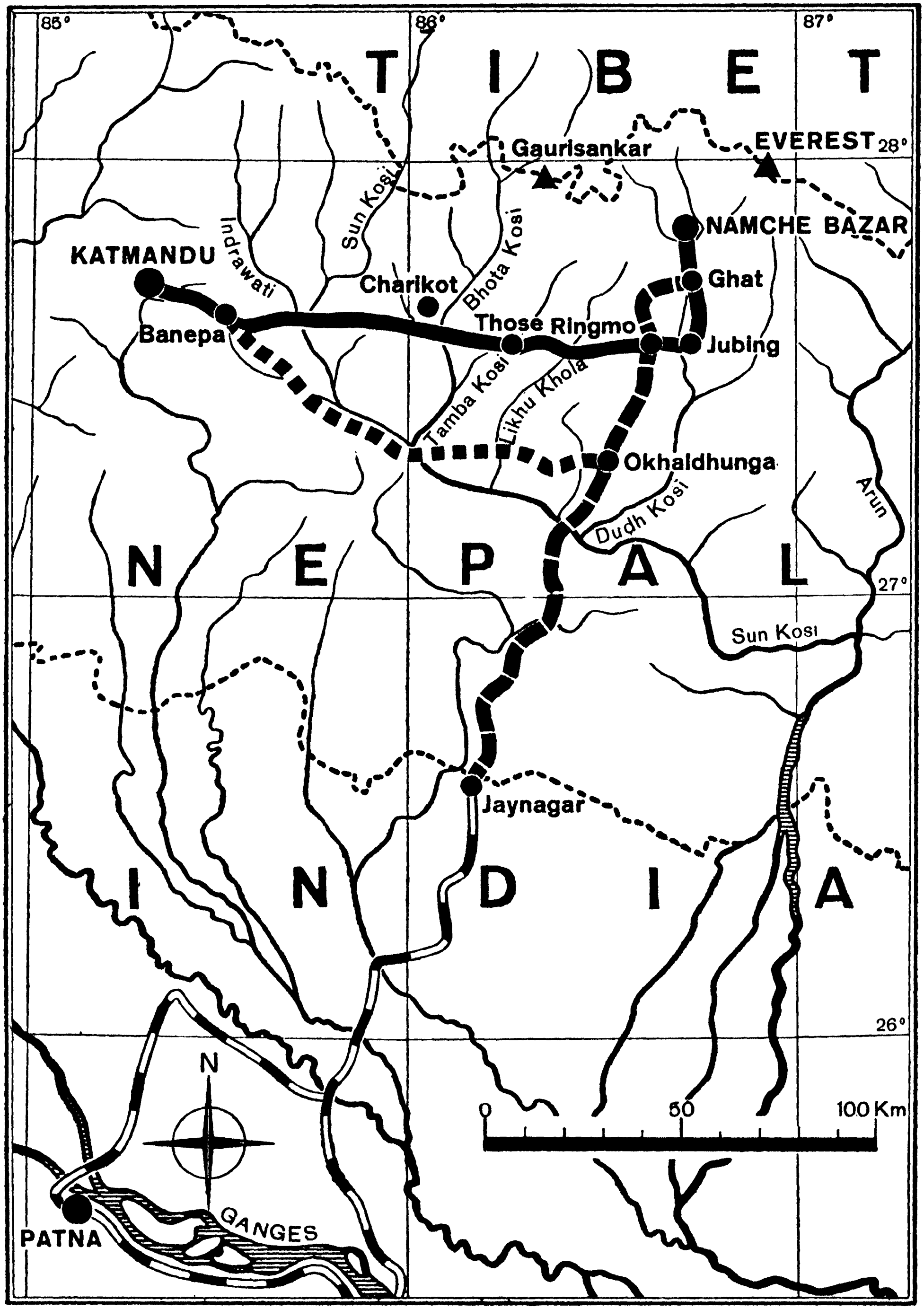
April: 20. Base camp (16,570 ft.)

(Sketch-map on page 59. Drawn from the expedition's notes, without reliable cartographical basis.)

4. Placing of the upper camps:

April: 25. Camp I on the almost snow-free central moraine, 17,225 ft.
28. Camp II in the middle of the Khumbu ice-fall, 18,374 ft.
May: 4. Camp III at the top of the Khumbu ice-fall, 19,358 ft.
9. Camp IV in the middle of the upper basin, 21,162 ft.
11. Camp V at the end of the upper basin, 22,639 ft.
26. Camp VI on the Lho La (South Col), 25,854 ft.
27. Camp VII on the south-east ridge of Everest, 27,560 ft.

(Bird's-eye view on page 71, drawn by Otto Betschmann.)


85°
86°
87°
28°
27°
26°
TIBET
NEPAL
INDIA
Gaurisankar
EVEREST
NAMCHE BAZAR
Ghat
Jubing
Ringmo
Those
KATMANDU
Banepa
Charikot
Okhaldhunga
Jaynagar
PATNA
GANGES
Indrawati
Sun Kosi
Bhota Kosi
Tamba Kosi
Likhu Khola
Dudh Kosi
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N
0
50
100 Km

THE APPROACH: FIRST CONTACTS WITH THE BUDDHIST WORLD

By René Dittert

In days gone by it took three days by mule-path to reach Katmandu, the capital of Nepal. To-day, forty minutes by airplane is enough.

We were at Patna, in the Indian province of Bihar. It was very warm. The plain of the Ganges stretched out of sight. At the air station we joined a few Indians, some women in saris and some Nepalese in clinging trousers and little caps of white cloth: these were our travelling companions.

The airplane took off and gained altitude; the plain slid by, the villages following each other rapidly. The abundant waters of the Ganges rolled on nonchalantly. Then came wooded hills and the immense virgin forest which stretches for thousands of miles, as far as Assam and Burma, serving as a refuge for tigers, elephants and rhinoceri.

Heavy storm clouds were drifting across the sky: the plane descended, skimmed the hills and arrived abruptly above a plain surrounded by rounded hillocks which were covered with terraced cultivation. This was the rich green plain of Katmandu, where rice and corn are grown. Trim little houses appeared: an affluent region. Soon we were landing. The plane gently touched down but quickly rose again, uncertainly, banking first to the right and then to the left, finally and roughly resuming contact with the earth. We were lucky to escape without injury: quite simply, it seemed we had jumped over a cow which was crossing the runway.

We were now in Nepalese territory. Flory and I—who preceded our comrades by a few days—passed through Customs without difficulty and made at once for the heart of the place.

It would certainly take months to know this fairy-tale city thoroughly. Very numerous were the Hindu temples and the pagodas with roofs of gold and of silver, flanked with curious objects, and ornamented with finely executed friezes. The main thoroughfare was very lively: a smiling crowd was busy about its richly stocked bazaars, talking and trading, indifferent to the ancient car in which we were seated, which bounded along a furrowed surface designed only for heavy bullock-carts. As everywhere in the Orient, barber and bootmaker worked in the open air, while the sacred cows strayed in search of the garbage on which they feed. We went down into the city's only hotel and took a meal. The comfortable life was ended; adventure was beginning.

This morning the sky was grey and it was cold. We had much to do: we proceeded to make various necessary purchases (rice, dhal, petrol, flour, cooking utensils, etc.) and we had also to go to the bank to change our traveller's cheques, as well as to the Indian post office; Nepal is not a member of the World Postal Union and it is India which takes charge of the foreign post.

We had the great pleasure of making contact with our Sherpas, who had just arrived from Darjeeling. Our old friends were all there: those of 1947, Tensing and Ajiba; those of 1949, Dawa Thondup, Pansy and Aïla; and those of 1950 too. Others had been at Annapurna and Nanda Devi. On the other hand, several of those with us were on their first campaign. The old and the young, the experienced and the novices, they were all pleasant, smiling, happy and full of goodwill. They were to show their mettle on the approach march. Higher up, in their own country—which is also that of Everest—they would be even more at their ease. Heavy loads, the installation of camps, the altitude—nothing discouraged them; they always answered smilingly: "We are ready, Sahibs."

In this land everything is done tranquilly, each thing in its turn. Hours were spent in counting ten thousand Nepalese rupees in one rupee and half-rupee pieces; our various purchases also took hours to carry out. But it was to prove futile to try and implant our hectic European methods here; our nerves were to be tried uselessly, and we were to run up against the unconcerned benevolence of the East: quietness and patience are *de rigueur* at Katmandu, as they were to be throughout Nepal.

Our comrades joined us. Like ourselves, our four tons of goods had been brought from Patna by plane, and it was close to the airfield—which was nothing but the capital's former polo field—that everything was got ready, packed, tied up and divided into loads of 30 kg. (66 lbs.) each.

Innumerable curious people followed our work with astonishment; they attentively watched each of our movements, standing stupefied before our sleeping-bags, our wadded jackets and our tents, and breaking into exclamations on hearing us try out the radio transmitters and receivers. Those who were barefoot were in extasies over our footwear and our high-altitude boots. I asked myself what were the problems and the reflections which the passing of this first expedition would give rise to. What must these simple people—impoverished workers—think, faced with so many things which they had never seen before, faced with ultra-perfected equipment whose purpose they did not know and which for them meant riches; for they lived on nothing, making do with a simple trestle-bed (if they had one at all), perhaps with a roof and, for many of them, only one meal a day.

However, I did not waste time on finding an answer to this question, for I sincerely believed that in the end these people were as happy as ourselves: happiness could, in fact, be seen in every face, and happy they would remain so long as there were not born in them the wants which they had not known hitherto.

Evening descended slowly. In the west the sky reddened; a pagoda stood out sharply against a dark sky, and far away the prodigiously high outline of the mountains grew slowly dimmer in the twilight.

We had just experienced our first days in Nepal. Tomorrow we would leave Katmandu and begin our march towards the mountains of the Himalaya, towards Everest.

Before setting out we took a last walk to Patan, one of the three large villages in the wide plain of Katmandu. Patan is astonishing; its houses are low, wooden and richly carved. Its main square—with not less than eight pagodas—left on us that evening a profound impression, although darkness had already fallen. The faithful could be heard monotonously chanting a prayer to the accompaniment of flutes and drums. The peaceful crowd, all clothed in white, glided along the narrow streets. It was a striking sight and created a typically oriental atmosphere which we absorbed avidly, since in a few days we should have left these towns to penetrate deeply into an extraordinary land which few travellers before us had been privileged to traverse.

It was the 29th March, the day of our departure. At the airfield the loads had been ready for the last two days and were lined up awaiting their porters. There were 165 of these to carry the loads as far as Namche Bazar, sixteen days' march, or about 140 miles.

The first men were there at eight o'clock. The loads were shared out; but it was difficult to maintain order, for our porters jostled one another, shouting and trying out the weight of sacks and boxes, each looking for the load which seemed to him the pleasantest to carry. But this was understandable, for the loads they chose they would have to carry as far as Namche.

These men were strongly built and did not have the sorry bearing of those I had known in 1947 and 1949. We had signed a contract with the recruiting agent in due form, and this was subsequently approved by the local syndicate. Everything in that respect was thus in order and we therefore hoped to avoid the endless palavers which always follow verbal agreements. Each porter was to receive three rupees a day, but he had to meet the cost of his own food and lodging. An advance of twenty-three rupees was granted them, and the balance of their wages was to be paid at destination. For their return journey, each was to receive a viaticum of twenty-four rupees.

We left Katmandu after taking leave of Dr. Hagen, who had greatly helped us during the last few days. The road we followed across the plain was a dusty one. At Bhadgaon the crowd was dense; it was market day. It was a curious town: a stone portico in Indo-Muslim style gave access to the main thoroughfare, bordered with finely carved houses. A Hindu temple and a most attractive pagoda reminded us of the diverse religious influences which had dominated this land. Dr. Wyss joined us here, together with Indra Yung Tapa, the liaison officer appointed to us by the Nepalese Government; he would accompany us as far as Namche.

Banepa: the first stage. We quickly made dispositions for establishing our camp, always a long operation; before night fell, we were able to regale ourselves with excellent curry and rice.

The second day was endless; the departure was made too tardily. The porters, furnished with their advance, had gone shopping in the village; waistcoats, woollen blankets, onions, rice and lentils.

I was surprised by the ease with which our men carried their loads with the aid of the forehead strap. All of them were merry, joking and singing along the road. Their total clothing was a fragment of cloth around the loins or, quite simply, a rag *cache-sexe* held up by a string. Their bodies were marvellous and wellmuscled. Their naked skin, covered with perspiration, shone like bronze.

The whole country was a confusion of hills and valleys. Crossing a pass, Gaurisankar appeared before us, surrounded by peaks with elegant lines to which we were unable to give names. Then the road descended rapidly and led to the bottom of a wide valley, where some magnificent rye was growing. We passed numerous men and women from the villages who were going to town, heavily laden. Everything in this land was carried on the back. To several of the loads was attached a crate of hens. The cock, tied to the outside, clung to it with strange contortions so as not to be thrown from his perch. Everything in this land was picturesque, and all that we saw, men and things, was the object of notice and comparison.

The heat had become suffocating, the march was laborious, our thirst was unbearable, and we pursued our way with dust-covered lips. At last, near the junction of the rivers Indrawati and Sun Kosi, Pansy, our cook, had made a fire. After a bath, which banished our fatigue, there was a welcome cup of tea. It was to be followed by many others, late into the evening.

Night had fallen: sparkling camp-fires, singing porters, gaily shouting Sherpas—all this animation, all this curious life, made us appreciate how happy we were to be in contact with these good and simple men, with this welcoming and hospitable population, who were always ready to help us.

The stages followed one another in great variety; each was marked by some salient fact, some curious episode.

What a surprise awaited us at Those, the largest of the villages we had come upon until then! Those is a trading centre where the inhabitants of the highlands come to reprovision themselves with rice. There we found a rustic handicraft. In some primitive forges and in dangerous conditions, the craftsmen were working iron ore extracted from a nearby mine. They were making locks of a type peculiar to Nepal; traps and tripods, too. In accordance with a contract concluded with the State, the workmen were given the ore but were required to deliver a certain quantity of manufactured articles for which they were paid and on which a tax was levied. The natives, who were very welcoming, made us visit also an old factory which had long ago supplied rifles to the Nepalese armies.

At Those we completed our supplies of rice. We engaged there a few excellent porters who were on their way back to their valley in the district of Solo Khumbu. These were Sherpas. The more we penetrated the land, the more we met with friendly and smiling people with the prominent cheekbones and the slant eyes of Mongols. In fact, in a few days we were going to enter the region inhabited by the Bhotias and the Sherpas[1], a population which has come from Tibet by the high passes and has established itself in this part of Nepal. Moreover, these people have preserved the customs, habits and religion of Tibet. Like the Tibetans, they are hardy and have long, braided hair. They wear felt hats trimmed with fur, with peak and ear-flaps, and decorated in red and gold. The women wear two aprons coloured black, yellow and red—one in front, the other behind. The men dress in long dark robes, tied at the waist. In contrast to our coolies, who marched barefoot, the Tibetan is shod in calf-length cloth boots, the sole being reinforced with flexible skin. They walk fast, despite the heavy loads they always carry, even from tender childhood.

From Those we made for Chyangma. Now we were in Buddhist country; the prayer flags, floating in the wind, announced the fact; the Chorten[2] in this locality confirmed it. From the furthest antiquity it was in these mausoleums that the bodies of venerated Buddhists or important relics were buried. At the present time, according to Tucci, they are built "to recall some particular deed, or for the salvation of the one who built it or of his parents, or, yet again, as witness of acts of grace". The form of Buddhism practised throughout north Nepal is Lamaism, which first developed in Tibet and overflowed thereafter into Mongolia, China and a part of Siberia. It is to Lamaism that can be attributed the relaxation of discipline and the right of marriage amongst monks.

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[1] The name Bhotia is given to the children of Tibetan immigrants, while the name Sherpa is given to those of the third and later generations and has become the special name of the high altitude porters of the Himalaya.

[2] In Tibetan the word means "receptacle for offerings".

Having crossed a pass, we found ourselves in a new valley. But the tracks did not linger long beside the rivers, and very soon, resuming the line of the steepest slope, rose towards the most aerial ridges. It is there for the most part that the Nepalese shepherd builds his hut, fleeing the heat of the valleys and the anopheles mosquito, the propagator of marsh-fever.

Seta, where we camped that evening, was not a village such as we understand it at home, that is to say an agglomeration of houses. It was simply a few scattered dwellings surrounded by a sufficient growth of rye to feed five or six families. Round about the oaks were ravaged and stripped, for their foliage serves as food for the cattle. As we set up our camp near the forest, we were favoured all night with a deafening concert; bird-songs, various cries, the barking of jackals, and so forth; so we did not need much persuading to leave our tents as early as five in the morning!

A rough ascent awaited us; it was broken only by a halt in an imposing forest of gigantic trees, all covered with moss: the undergrowth was prodigious and the humidity was incredible. It was an extraordinary place. There the giant rhododendrons had a softer hue and the magnolias, covered with enormous white flowers, were of rare exuberance. Soon we passed beyond the region of flowers. On the ridge we reached the highest point of our march across Nepal: it was about 11,300 ft.

At Jumbesi—Gompachung in Tibetan (all the villages now had two names)—we set up our camp in the evening on a bed of *primula denticula*, mauve, blue or near-white. All the hills were covered with them. Our camp—the tenth since our departure—was situated in an idyllic spot. At the far end of the little valley an enormous mountain appeared from time to time. When the heavy storm-clouds tore asunder, it was possible to glimpse for a few moments the mountain walls to which clung hanging glaciers of gigantic size.

After the evening meal we retired into our tents; a little hail had fallen, but the storm had not broken; only the wind persisted for several hours. What a curious sense of security and comfort is given us by a tent and a sleeping-bag! We listened quite happily to the wind working at the tent-cloth, which resisted it and gave us protection.

From Jumbesi the track ran along a mountain-side, overlooking the deep valley. The grassy slopes incline at an angle unknown in our Alps. Everything in this pre-Himalayan country was on the grand scale; the differences of level to be crossed in a single day were enormous. It was nothing but an immense upheaval, a confusion of hills, gorges, mountains and valleys which we had to pass through, cross or work around. But how surprised we were when on these exhausting tracks we met whole families ascending from the lower country where they had gone for rice. All were carrying their loads: father and mother each had 80 kg. (1½ cwts.) while the children carried loads of 30 kg. (66 lbs.). And what can one say of these young girls who were returning to their village carrying, perhaps for ten days, loads of 65 kg. (143 lbs.) and who had yet, when evening came, the energy to make their toilet, to change their clothes and to smile?

The coolies wanted to stop at Ringmo, but we wished to push on further; so they were not very pleased, and during the ascent to Taksindhu Gompa[1] the column stretched out considerably. At the 10,000-ft. pass we encouraged them pleasantly; as for our Sherpas, they jostled the whole nonchalant crowd, shouting, and pushed our men onwards to the meadow surrounding the lamassery, where we established our camp.

While we were eating our evening meal the moon rose into the sky and flooded the alp with its pale light. When dinner was ended, we climbed up to the Taksindhu monastery to take part in a service to which the lama had invited us. The hall which served as the temple, for the temple itself was still under construction, was a low one, poorly lit and filled with smoke.

Some twenty trapas[2] were seated on the floor, cross-legged; they were of all ages. When I had made my way into the building, I was struck at once by the profound faith reflected by the faces of the congregation, on which were cast the shadows and the flickering light of the oil lamps placed on the altar.

The monks, all in red habits, were aligned along the sides; at the end of the hall stood the lama near the altar, richly decorated with flowers and with coloured objects moulded in butter; before him was the officiating priest a young seminarist. In the middle, also seated on the floor, my comrades mingled with the growing crowd of the faithful.

Prayers were recited, chants were sung to a langorous rhythm, very characteristic and captivating; at times it seemed as if we were listening to prayers in a Catholic church. There was something moving about this strange atmosphere. Suddenly, the lama sounded the *gyalong*, a silver trumpet; the trapas lined up and blew into the *kang-ling*, another trumpet, made of a human thigh-bone which—according to tradition—should be that of a virgin girl of sixteen. The rhythm grew stronger when the copper cymbals were struck; then the great temple drum added its sombre voice. For several moments the din was deafening; it seemed as if everything would break to pieces and tumble down.

The superior led the ceremony in a masterly way; he shook his bronze bell, beat the little two-faced drum called *Nga-chung*, asperged the altar with holy water, threw back his head, implored in the manner of the cult, and gave this spectacle, already strange to western eyes, an even more surprising character. Then came communion. Grains of maize were distributed; each of the monks, having kept them for a few moments in his clasped hands, swallowed some and cast the others to heaven. The service had already lasted some hours and a certain abandon took hold of the youngest. Then, although the ceremony had not ended, the very tolerant superior, passed round Tibetan tea.

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[1] Gompa = Monastery, lamassery.

[2] Ordinary monks; lamas are only those who have made certain studies and passed certain examinations.

Seated on the floor and tired of a posture to which we were not accustomed, we remained a long time in the temple among all these devotees, who filled us with infinite respect. We stayed long despite the smell; for these people know nothing of hygiene and never carry out the slightest toilet. When we left the smoky hall, where the service was continuing, this smell pursued us for some moments; but that was a mere detail. When I slipped into my tent by candle-light, I could still hear the sombre note of the drum, the clearer sound of the cymbals and the lugubrious booming of the trumpets; up there, at the monastery, the ceremony continued.

From Taksindhu Gompa a long descent led us into the valley of the Dudh Kosi[1]; our eastward march was ended. Now we made due north towards Namche Bazar and Everest, and we had a feeling of humility and weakness when we perceived at last, at the end of the precipitous valley, the highest mountain of our planet and its great neighbour Lhotse (27,890 ft.). It was a moving moment to find ourselves at the foot of this mountain which reached to the stratosphere! We tirelessly searched with our eyes very high in the sky for that marvellous summit which had haunted our climbers' dreams and which remains a problem for all those who have had the privilege of experiencing very high altitudes... and many others besides.

It was then sixteen days since we had left Katmandu. We were about to arrive at Namche, an important stage of the expedition. This village was to be our principal strong-point. It is the homeland of all the Sherpas who have won fame from the Karakoram to Sikkim, of those men who have contributed with all their strength and intelligence to the exploration of the great Asiatic chain, where there are still some of the largest blanks in the map of the world. Without them, the approach, like the access, to the few mountains which have been conquered would never have been possible, and we must proclaim our admiration of these ever-smiling men, loyal whatever the sacrifice, always ready to be useful, in a word, of these friends whom one meets again with so much pleasure, who force one's respect and inspire with the necessary confidence those who desire to attack the highest and at the same time the most forbidding of mountains.

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[1] *Kosi* signifies a large river; *Khola*, a little river.

So here was Namche Bazar, at about 11,000 ft. Its numerous buildings, all alike, rising in tiers around a great amphitheatre, are surrounded by fields of potatoes, the principal food stuff of the dwellers in this high region. It is a large village, whose population is by race, language and custom essentially Tibetan. We passed beyond it to establish our camp a little higher up. Pansy, our cook, was already installed in an old ruined shanty. Everyone was pleased that day and, after changing clothes, swallowing the traditional cup of tea and taking off our big boots, we sat down on some of our numerous cases and discussed with Tensing some questions relating to the prosecution of the expedition; purchases, coolies, etc. Everything was arranged as best we could. We obtained rice, petrol, a little sugar (at six shillings a kilo) and some tsampa[1]. These goods were paid for partly in banknotes and partly in cash, for the inhabitants prefer the latter to paper; it was the same with the wages of our coolies from Katmandu, who on this day left us in order to return to their capital. At Namche we engaged mountain porters who would go as far as our base camp. Having made these dispositions, we went to the village.

Narrow and muddy footpaths led us among the stone houses. Smiling faces bobbed up at the windows, with eyes wide-open with curiosity. We went into one of these houses: crossing the stable, a wooden staircase led to the upper floor. Here the whole family lived, sleeping on the bare floor, rolled up in blankets of yak's wool. On the hearth burned a permanent fire which smoked everything. With a wholly oriental courtesy—for hospitality is on the grand scale here—we were offered carpets to sit on. We had come by accident to the home of the village mayor—well-to-do people. Their affluence was made obvious by the numerous and enormous copper vessels lined up on one side of the room, and also by the quality of the tea we were offered in pretty cups of porcelain china. All the utensils, all the articles used, were tasteful and skilfully worked—like the samovar and the many religious objects placed in front of a gilded Buddha, originating from Tibet or Pei-ping. These objects had been brought by caravaneers from China, Lhassa, Schigatse, Gartok or Kashgar, who have for centuries crossed the high Himalayan passes leading to Nepal and India. It is thanks to these connections with Tibet and to the trade which is kept up with that country that the population of Solo Khumbu[2] has been able to maintain and cherish many nice traditions.

In the summer months the traffic is intense. From Namche Bazar it is over the pass of Nangpa La[3], 19,000 ft., that petroleum, rice, sugar, paper, etc., are transported, on men's backs or on yaks, to Tingri-Dzong, while from Tibet come salt, borax and wool.

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[1] Roasted barley meal. Cooked with the addition of water and butter, this meal is high-level foodstuff of the Sherpas.

[2] The district of which Namche Bazar is the principal village.

[3] *La* = pass.

In the evening we climbed back to the camp. The members of our Sherpas' families who came to call on us were numerous. They brought potatoes, eggs, *rakschi*, *chang*, *arak*, beverages more or less high in alcoholic content, which looked like the most ordinary products but were also equal to the strongest of our own.

All these people affected us by their simplicity, their cordiality and, above all, by the very touching gestures which accompanied their presents: after tendering their presents with both hands, they bowed deeply, took our hands and lifted them to their foreheads.

We stayed two days at Namche Bazar, two marvellous days, to reorganise ourselves and also to rest a little. We were continuously surrounded by natives who watched all our gestures, all our movements—by people whose welcome made on us a profound impression. Certainly, they were dirty and coarse, wiping their noses with their fingers, spitting profusely and scratching themselves incessantly; but we were now used to their ways. We will never forget our stay at Namche Bazar, nor the friendly reception which was given us by its inhabitants; we will always preserve the memory of their pleasantness, their hospitality and all that they did so spontaneously to help us.

FROM NAMCHE BAZAR TO THE BASE CAMP

By René Aubert

For four months we had been repeating the name of Namche Bazar, that far-off village in the confines of Nepal, on the frontier of Tibet; and here it was, nestling in a fold of the earth, with dry-stone houses, all alike and reminding one of military hutments. Its inhabitants, with slit-like eyes and prominent cheek-bones, are of pure Tibetan type. Full of curiosity, they surrounded our camp, following our least movements with their eyes; but Tensing was there to hold them at a distance. Our Sherpas had drawn up their loads in a row and were watching over them. Our tents were pitched.

For the first time since our departure from Katmandu, we were to rest for two days. We changed porters and bought our last supplies: rice, flour, sugar, petroleum. The following day, the coolies were to be paid off, which is always a very picturesque affair. Our evening around the camp fire was an excited one and justifiably so. We had that day experienced a thrilling moment, for we had seen for the first time, rising above the other summits, the roof of the world—Everest—shining majestically with a white plume at its peak.

On the day before, we had still rejoiced at the prospect of being able to rest; but already the lure of something new had possessed us. So in the morning we climbed a neighbouring summit to take photos of the coveted mountain, Dr. Wyss and Dr. Chevalley coming with us. The view was superb; the mountains glittered, their faces cut by couloirs and defying any attempt at ascent. These summits were not made to be climbed; they were no longer on our scale and all of them were vertiginous. Looking upon these marvels, we tried to work out a plan of attack on the object of our expedition, but how many times would we be obliged to modify it, how many unforeseen factors would arise, how many unsuspected difficulties would thwart our schemes! Optimism reigned nevertheless.

The seventeenth stage took us to the Thyangboche monastery. The track skirted a very deep and precipitous valley, through which the Imjya Khola flowed. New summits came into view. We passed through woods of spruce and birch with russet-red and silver trunks. The day was very fine, so that we enjoyed the magnificent walk. Occasionally we passed some natives, and one of them showed us a certificate signed by Shipton, and told us he was on his way to offer his services to the English expedition which would arrive that day at Namche Bazar. The post and telegraph services are not indispensible in this country, for news spreads very quickly. For instance, throughout the approach march our sirdar, Tensing, knew all about the progress of the English expedition, which was taking, however, a quite different itinerary; in fact, it was coming from Jaynagar, from much further south.

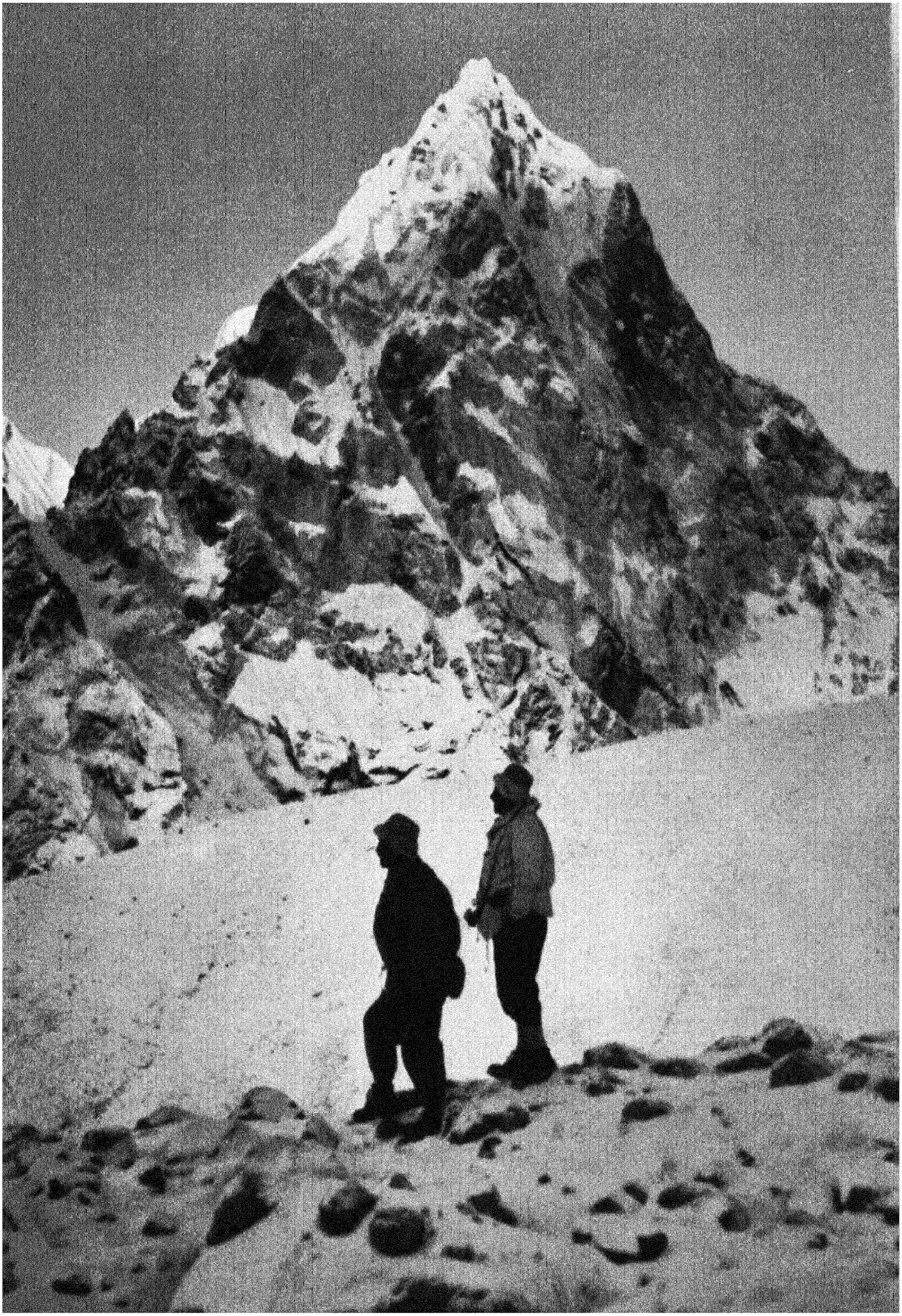
For the last time we crossed the Dudh Kosi; we took advantage of this by taking a last bathe in water that certainly had not the same temperature as we were used to at home! After a long ascent we eventually arrived at the Thyangboche monastery.

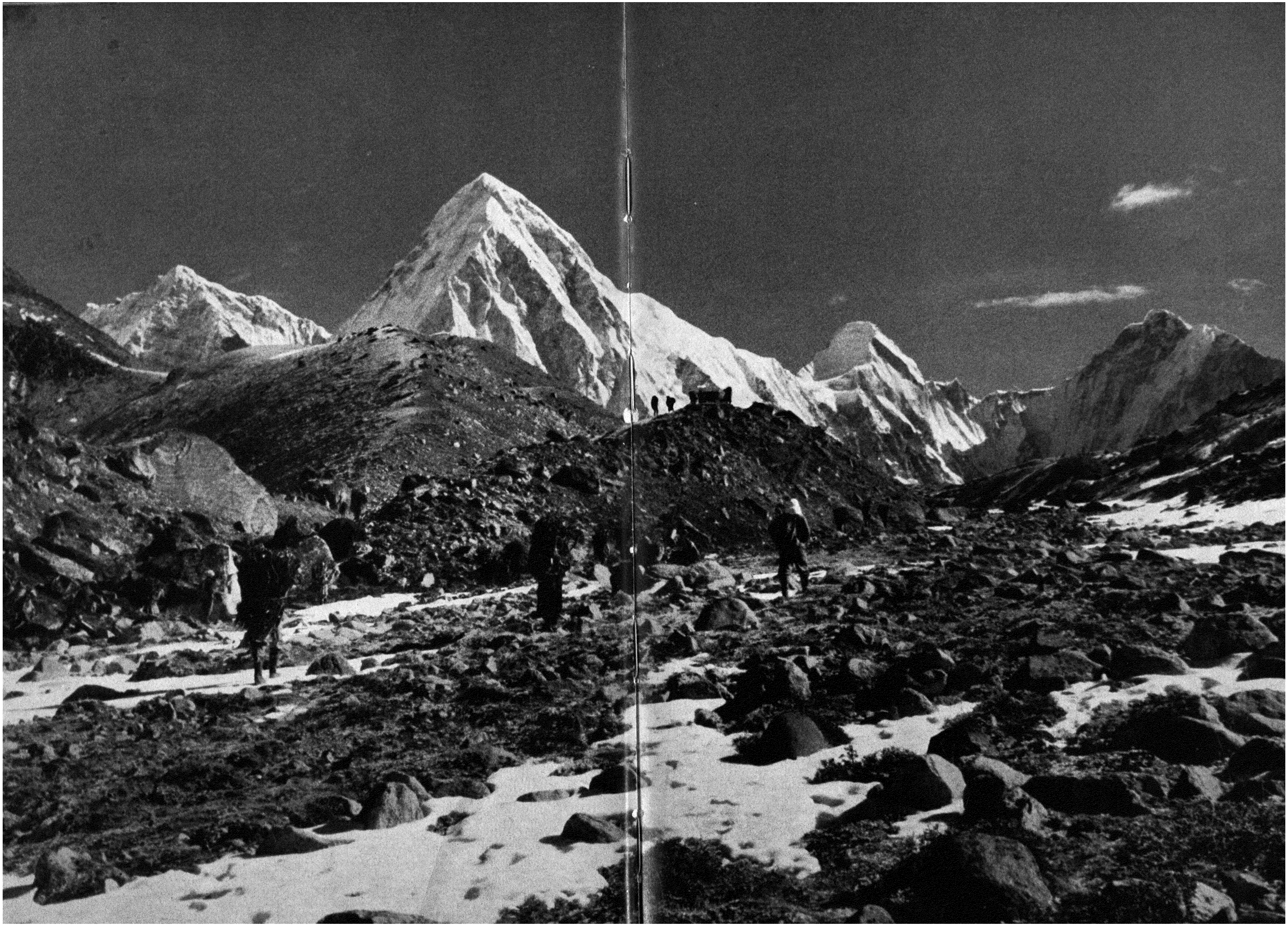
The site chosen by the lamas for building their temple is superb. The plateau formed by the summit of the hill is covered with pasture; downstream, the view stretches over the valley we had just ascended, at the bottom of which winds the Dudh Kosi, while the horizon is closed by the wondrous summit of Kangtega. Upstream, the land is much wilder, the valley narrows and its sides are more rugged.

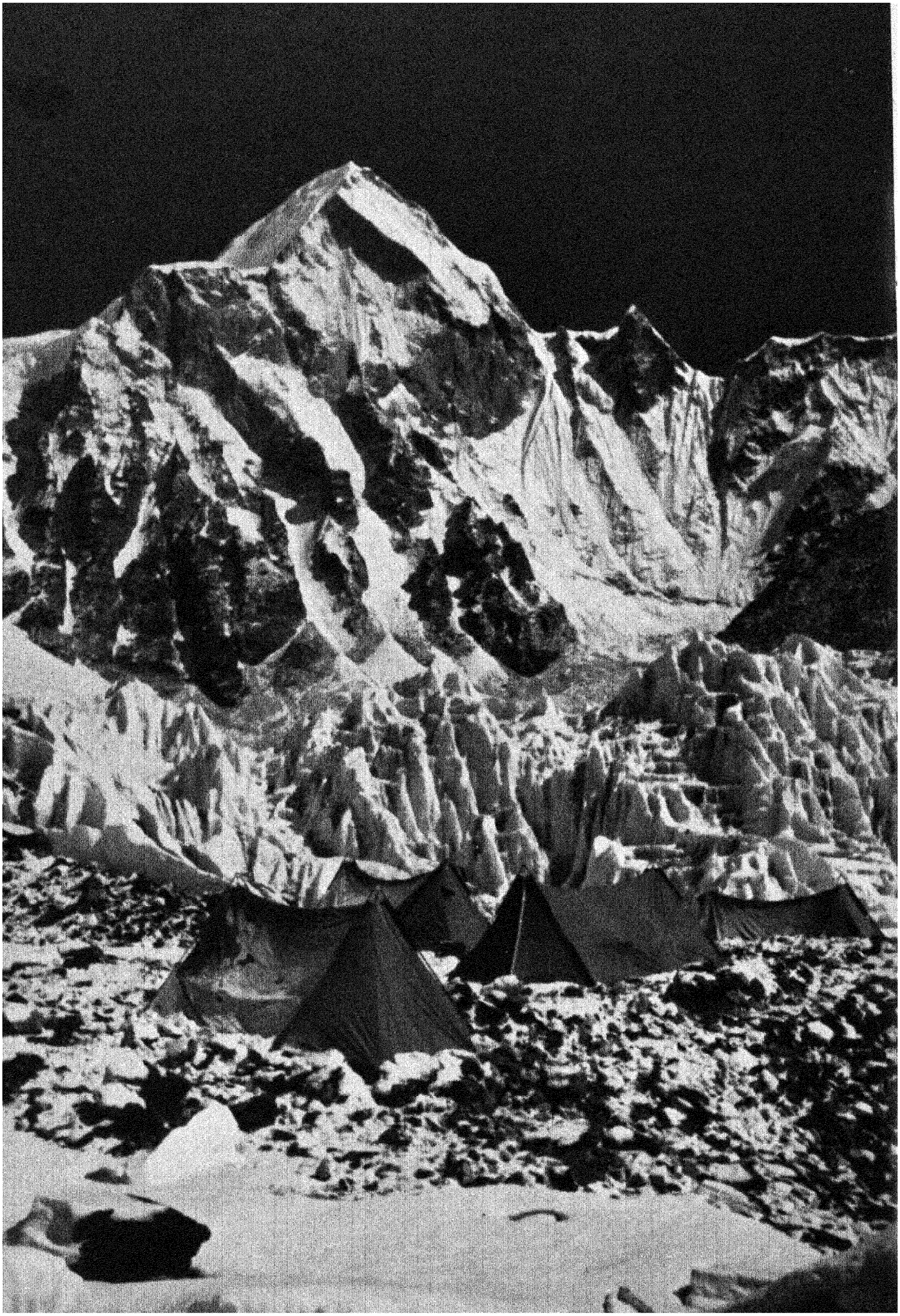
Our reception by the lamas was very cordial. They awaited us under an arch at the exit from the road, dressed in long red robes. For this reception a large tent had been set up, decorated above the entrance with strange blue paintings. Inside it was immense; that evening we should be able to eat in comfort. The leader invited us to take tea, then to visit the monastery, a strange building with roofs set one above the other. Against the surrounding wall were fixed some sixty prayer-wheels, and it was customary for visitors, just like the faithful, to spin them before entering the sanctuary. We lent ourselves readily to this ritual, one behind the other, under the direction of a young priest. In the inner courtyard, at the foot of a wide staircase, we were invited to take off our boots. Each of us received a little stick of burning incense. Our eyes had difficulty in accustoming themselves to the darkness within the temple, when, as required by Buddhist ritual, we made the circuit of the sanctuary from left to right. The walls were curiously decorated with coloured statuettes, gold and purple predominating; tankas and crudely carved masks hung from the pillars, while in the middle an enormous Buddha stretched out his many arms. The priest who was with us invited us to bow before the idol; he himself touched the base of the statue with his forehead.

Plate 5: The granite peak of Cholatse (21,150 ft.), overlooking the confluence of the rivers Chola Khola and Lobujya Khola; the latter rises in the terminal moraine of the Khumbu Glacier.

Double plate 6–7: The moraines of the Khumbu Glacier in the circle of Everest's satellites: Pumori (23,190 ft.) then, towards the end of the valley, Lingtrentse (21,730 ft.) and Khumbutse (21,710 ft.).







A narrow staircase led to the first floor: in a corridor, numbers of priests prayed while drinking tea, and on our right a spacious hall opened out, revealing statuettes of all shapes and sizes, which had been presented by rich pilgrims. The upper floor was reserved for the urns containing the ashes of the deceased Grand Lamas. Our visit ended in the superior's room, where Tibetan tea was offered us in very pretty cups of silver or porcelain china. This nauseating drink is made of salted tea to which rancid yak's milk is added. Only Raymond Lambert took the decoction and on his own drank five or six cups. After the indispensable congratulations, we took our leave.

At supper in the tent we discussed this strange visit and the things about it which had struck us most.

When we woke in the morning a surprise awaited us. In the night it had snowed, so that our tents were lightly covered, but the snow melted at the first touch of the sun. During our preparations for departure, a Tibetan woman, the mother of one of our Sherpas, invited us into her home. The interior was dark, but very clean and neat. In a corner the hearth was flush with the floor. Around the room, on shelves, were large copper vessels containing the provisions. A small meal was offered us of tea and roast meat. It was the first time we ate with chopsticks, but after numerous efforts and fruitless attempts we preferred to help ourselves with the "pincers" provided for us by nature.

That day we passed the level of 4000 metres (13,124 ft.) and halted where the valleys of the Imjya Khola and the Dudh Kosi divided. On our map one of the valleys had not been marked, but after mature consideration, we decided to take the one on the left and ascended the course of the Imjya Khola. We pitched our tents at Pheriche and the next day an advance-guard was sent out on reconnaissance. They left early. In the night there had been some snow; a light white carpet covered the wide plain, but it did not prevent the yaks from going out to pasture.

That day, the porters were only to cover a short stage. In the afternoon the weather broke. Snow fell again and the clouds rose to attack our camp in the Chukpula pasture. Without wishing to show it, we were anxious for our comrades who had left on reconnaissance and, one after another, we asked Dr. Wyss if we might go to meet them. Furnished with horns, we climbed along the moraine and at regular intervals blew a short call. A shrill blast of a whistle cut through the air: they were there. As quickly as possible we set out to meet them

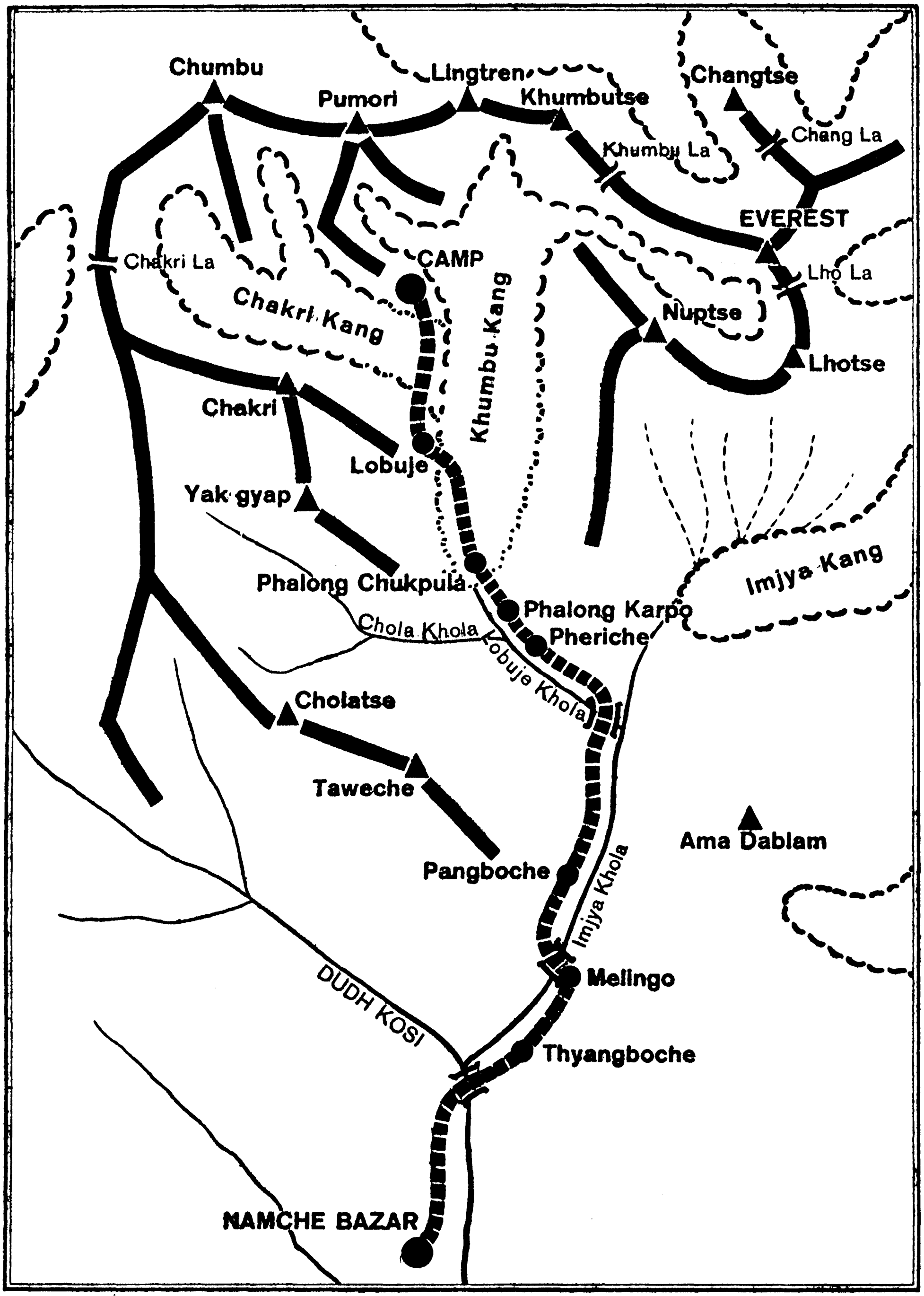
Plate 8: The Khumbu Glacier at the point where it curves southwards. Lingtrentse (21,730 ft.) closes the valley; the dark point to the right of the summit, rather like a tooth, was called "Domino" by the expedition.

and we were soon together again. We deluged them with questions. The news was good, for they had been able, thanks to a break in the cloud, to recognise the bottom of the Khumbu La. At twilight we were all assembled at the camp.

"Come on to the moraine, I've got my camera!" It was with these words I was dragged from my sleep. Quickly leaving my tent, I was dazzled by the wild beauty of the circle of mountains before my eyes. I climbed as quickly as the altitude allowed; Roch was already taking photographs. There are no words effective enough to describe such wonders. The valley was still bathed in shadow, cold and steely blue; the summits glistened in the rising sun, their precipitous faces engraved with couloirs and their slender ridges edged with cornices that defied all the laws of equilibrium; each had its impalpable white plume. The sun slowly rose and reached our tents. A thin column of smoke escaped from the kitchen. I mused upon the privilege we had had, of being able to look upon such wonders.

From Lobuje, a summer pasture for yaks, where we had arrived the previous day, we went out upon fresh reconnaissances to find as easy a route as possible in the immense moraine bordering the Khumbu Glacier. Our porters, all of them used to the mountains, went down again into the valley to search for juniper wood, which was to take two days to transport.

On this day it was my turn to set out on reconnaissance, with Dittert, Lambert and Hofstetter. We laid out a route and we organised the base camp at the edge of a lake. Huddled between the mountains and the moraine, it would be sheltered from the winds. Despite the altitude, grass and a few small flowers gave a living touch to the landscape. Our master-cook, Pansy, constructed a most comfortable kitchen. And so were established what were to be our headquarters for more than two months to come.


Chumbu
Lingtren
Changtse
Pumori
Khumbutse
Chang La
Khumbu La
EVEREST
Chakri La
CAMP
Lho La
Chakri Kang
Khumbu Kang
Nuptse
Lhotse
Chakri
Lobuje
Yak gyap
Phalong Chukpula
Imjya Kang
Phalong Karpo
Chola Khola
Pheriche
Lobuje Khola
Cholatse
Taweche
Ama Dablam
Pangboche
Imjya Khola
Melingo
DUDH KOSI
Thyangboche
NAMCHE BAZAR

THE KHUMBU ICE-FALL

By André Roch

While the main body of the expedition was at the base camp, a first party, consisting of Dittert, Lambert, Chevalley and Aubert, left Camp I on the 26th April to explore the séracs. During recent days the weather had not been good. It had snowed and this bed of fresh snow rendered the exploration both fatiguing and perilous.

This ice-fall, nearly 3000 ft. in depth, situated between 17,000 and 20,000 ft., did not look easy to cross. What we saw of it was an indescribable chaos, a mass of shattered ice blocks, overlooked by the blue-green slabs of the glaciers hanging from the lateral slopes of Nuptse and the western buttress of Everest.

We knew that in the autumn of 1951, when the numerous snowfalls of the monsoon had probably made the advance easier, the British climbers of Shipton's party had three times ascended to the top of the great glacier fall without having been able to escape on to the upper plateau. The numerous photographs we had studied had shown us nothing. Would we be able to get through on the right-hand side? Alas! on the spot this eventuality proved impossible. In our experience of glaciers in the Alps, unpassable séracs are rare: it is true that at home there are hardly any glaciers with a steep descent of 3000 ft. which one cannot easily evade. In fact, no one amuses himself climbing up the middle of the Glacier des Bossons in the Chamonix valley; no one any longer ascends the glaciers at Saas-Fee now that there is a good track along a lateral moraine which avoids all danger. But at Everest these séracs constitute the sole means of access from the south and they are a dangerous obstacle.

Whenever a glacier flows over an ever-increasingly inclined plane, it at once splits throughout its width into crevasses which open up and become immense. This zone is generally the most difficult to cross. Below this upper part, the slope becomes accentuated and longitudinal crevasses break up the enormous slabs of ice and so create a typical formation of tremendous cubes. If the slope inclines still more, these immense blocks, each the size of an appartment building, split and partly break to pieces, forming towers, needles and minarets which lean over, twist and crash in fragments, bringing chaos to the highest degree. When the slope eases off towards the bottom, all these shattered towers accumulate and form nothing but a mass of blocks, a sort of regenerated glacier which, if it is not too crevassed, is relatively easy to cross. A glacier does not hold on rock walls; it breaks up into great slabs, which fall down in small pieces and reform at the foot of the precipice into a new glacier.

The séracs of Khumbu assume all these forms. Above are immense crevasses constituting the most difficult part. Lower down, the huge cubes become towers which, breaking up, accumulate in a horrible mass of blocks. This mass then splits and forms a new and very crevassed glacier.

Besides these obstacles inherent to séracs, fresh snow hides the multiple fissures, so that our comrades of the advance party did not have an easy task. They exhausted themselves in tracing out a route through the labyrinth. During this time, Flory, Hofstetter and Asper left the base camp for Camp I. On the same day they climbed up a buttress of Lho Peak, facing the séracs. Unfortunately, the weather remained overcast and prevented them from taking good pictures of the fall.

On their return to base camp that evening, their story was scarcely encouraging. This is the news they gave the leader of the expedition: they had ascended until two in the afternoon and had met with nothing but immense difficulties half-way up the glacier fall. In compensation, the itinerary from base camp to Camp I was an enchantment, passing for two or three miles along a lane between ice-pinnacles, some of which were more than 100 ft. high.

The following day, while the first group repeated its attempt, the second assault group (Flory, Hofstetter, Asper and myself) went up to Camp I to get nearer to the scene of action. Dr. Wyss-Dunant joined the party. We were at Camp I by noon. During the afternoon, impatient to see the séracs at close quarters and to ascertain the chances of success, we followed in the track of our comrades. The beginning was easy. We had to tack about among needles of ice—to descend some fifty feet in a couloir of steep ice and ascend again through a glacier torrent to the foot of the steep slope. In places this torrent formed pools, more or less frozen over, in which we took involuntary baths, both frequent and unpleasant.

Before we came to the slope, the track traversed a sort of collector couloir of a steeper and completely ruinous part, down which, from time to time, rolled avalanches of blocks and over these we had to pass. This section scarcely pleased me and I thought that I would certainly have passed further left in order to avoid that danger. I mentioned this to Dittert, but no one was anxious to alter this exposed part of the route.

We were then engaged in a long climb describing numerous loops. The tracks melted away everywhere and then reappeared, witnessing to the efforts of our comrades to find a good route. The crevasses were almost always crossed on fragile snow-bridges. Often the ascent of upright walls required great efforts.

The parts of the route which ran beneath towers that were threatening to fall were most disagreeable.

Two hours and a half of arduous ascent brought us to the top of the lower slope, to the threshold of an intermediate level. Tired out, we had had enough for the day. Where were our comrades? Suddenly they showed up a hundred yards away, slightly to the right. But they disappeared almost at once behind some ice. Excitedly, we called out to them, but we got no answer. "They are rather uncommunicative", we thought. It did not look as if things were going as they wished. We saw them straddling a blade of ice and then vanish again and not reappear. Where had they gone? Time slipped by, and no one was seen. Was this a joke? Then, at the end of an hour, they joined us, coming out of a crevasse that was more or less filled with blocks. We plied them with questions. "What is it like? Is there a way out? Is it difficult? Is it dangerous?" All that Dittert replied was: "It will be all right", which we took to mean "It won't be all right".

Bit by bit a few descriptions escaped their cracked lips. They were discussing things between themselves rather than replying to us. "If, after that block of ice, we had passed below those two towers, we should have gained at least thirty yards!"—"Yes, but we should have had to cut steps in an extremely steep slope and then come upon another crevasse." We repeated our questions: "Would there be a better chance more to the left?" To which Dittert replied: "I don't know, but it will be all right."

They were exhausted. They emptied our water-bottles and descended rapidly in the tracks which we had improved during the ascent.

We realised that the track followed to the point where we had met them was nothing compared with what followed. In fact, our comrades had taken a good hour to cover a hundred yards in the reverse direction, that is, in the tracks they had made while ascending.

While descending to Camp I, we considered that to try and cross the séracs right up the middle was hopeless, nothwithstanding that the British photos were taken quite close to the top in the very middle of the glacier. It is very probable that progress after the monsoon might be much easier over the great beds of snow which would have filled the crevasses and often provided usable bridges.

The following day it was the turn of Flory, Asper, Hofstetter and myself to try and cross the séracs. We pitched a camp on the intermediate plateau.

To spend the night at this Camp II was scarcely an ordinary experience. In fact, the three tents were set up on a rectangle of snow bounded on all four sides by deep crevasses. The glacier was in continuous movement, so that, when we were peacefully stretched out in our sleeping-bags, we would be suddenly surprised by a series of shocks, followed by a noise like thunder. These were caused by tumbling séracs or by the opening up of new crevasses.

While we were putting up the tents, one immense tower had capsized upon another, which broke up into an avalanche of blocks. The sight resembled a game of skittles. These blocks had fallen almost soundlessly. We were stupefied to realise that this collapse took place at the spot where we had seen our comrades for the first time when we had been out looking for them. After that incident, we made our decision: we would try to find a way out of the séracs by ascending on the left of the glacier. In fact, the only passage was over the accumulation cones of avalanches that had fallen from the western buttress of Everest, 23,460 ft. high, and had filled the crevasses. This right side of the glacier is much less chaotic than the centre or even the left. But the slope which overlooks it is 5000 ft. deep. Blue-green slabs of glacier hang from it. Personally, I thought that these avalanches were even more dangerous than falling ice-towers, for if a great mass of ice were released, it would lay waste everything in its path and cover at least half of the glacier. However, we had no other choice; our only chance of success lay that way.

The next day we were on our way at eight in the morning. An easy snow-couloir brought us to the foot of the great slopes. At close range they were even more frightful. We could see that the glacier was entirely made up of blocks of ice fallen from above. A glance into the interior of the crevasses revealed a sort of pudding-mixture, but instead of a pudding of rocks it was a conglomeration of blocks of ice, snow and stones.

Flory, in the lead, laboriously made the track. Often we could not get through; then we went back and tried elsewhere. In order that our exposure to avalanches for as short a time as possible, the great deltas were crossed at top speed. Such forced marches at nearly 19,000 ft. winded and exhausted us. The cones of dejection are sometimes split by great crevasses which one has to walk along until a fragile snow-bridge is found, on which one crosses like a tightrope walker.

Two of these deltas had been crossed. We had almost reached the upper plateau. Our pleasure was great, for victory seemed near. However, several crevasses still barred the road. Fortunately our track was here less directly menaced by falls of séracs from the interminable slope of the western spur of Everest. To avoid one crevasse, we had to turn left, climb a hillock of snow, then descend a sixteen to twenty-foot wall on to a further plateau, where we could advance to another crack quite as large and deep blue in its depths. On the left a series of towers barred the way. On the right, however, there was a hope of getting by. We went forward along a tongue between two crevasses. This terrace was frightening, for it sloped downwards and overhung the lower cleft in an alarming fashion. One look into this labyrinth, filled with instable blocks, themselves cut by blue-black gaps, discouraged us.

After a half-hour of vain searching we found ourselves again at the edge of the crevasse which seemed to bar the way completely. Asper went down on the rope into the depths but did not succeed in crossing to an ice-chimney which would have permitted him eventually to ascend the other side. After much hesitation and discussion, there seemed only one solution: to get by against the mountain to the left, beneath a great wall of ice some 100 to 130 ft. high.

There was nothing attractive about this wall. On it the sun had carved a lacework of perforated icicles, hanging from instable blocks. At the foot of this jagged wall a slope offered a relatively easy passage, but it was much exposed. However, nothing was moving, nothing falling. We had to take our chance. We drew near to the wall by crossing several crevasses covered over with powdery snow and by passing between two towers. But at close range this rampart was terrifying. The risk was too great. We turned back and found ourselves once more at the edge of the crevasse, for this had truly become the one barrier to our escape.

We made another inspection to the right. It was worse than the rampart. Then we returned to the foot of the latter—and hesitated! The hours passed. Hofstetter fortunately brought us back to reason: "We'll come back to-morrow and see; we shall find a solution. Let's get back to camp!" After a further hour of hesitation and searching to and fro, to left and right, we gave up, sick at heart. We had not escaped to the upper plateau, the way was barred, we were beaten. But in my heart I considered that we were not finally defeated, for we still had at least three chances: to climb one of the towers on the left and, on a rappel, pendulum fashion, reach the upper lip of the crevasse; to swing pendulum fashion down in the crevasse itself to a knob of snow some 20 to 23 ft. lower down; or to pass under the rampart on the left. Once on the other side, it would be easy to set up a rope-bridge.

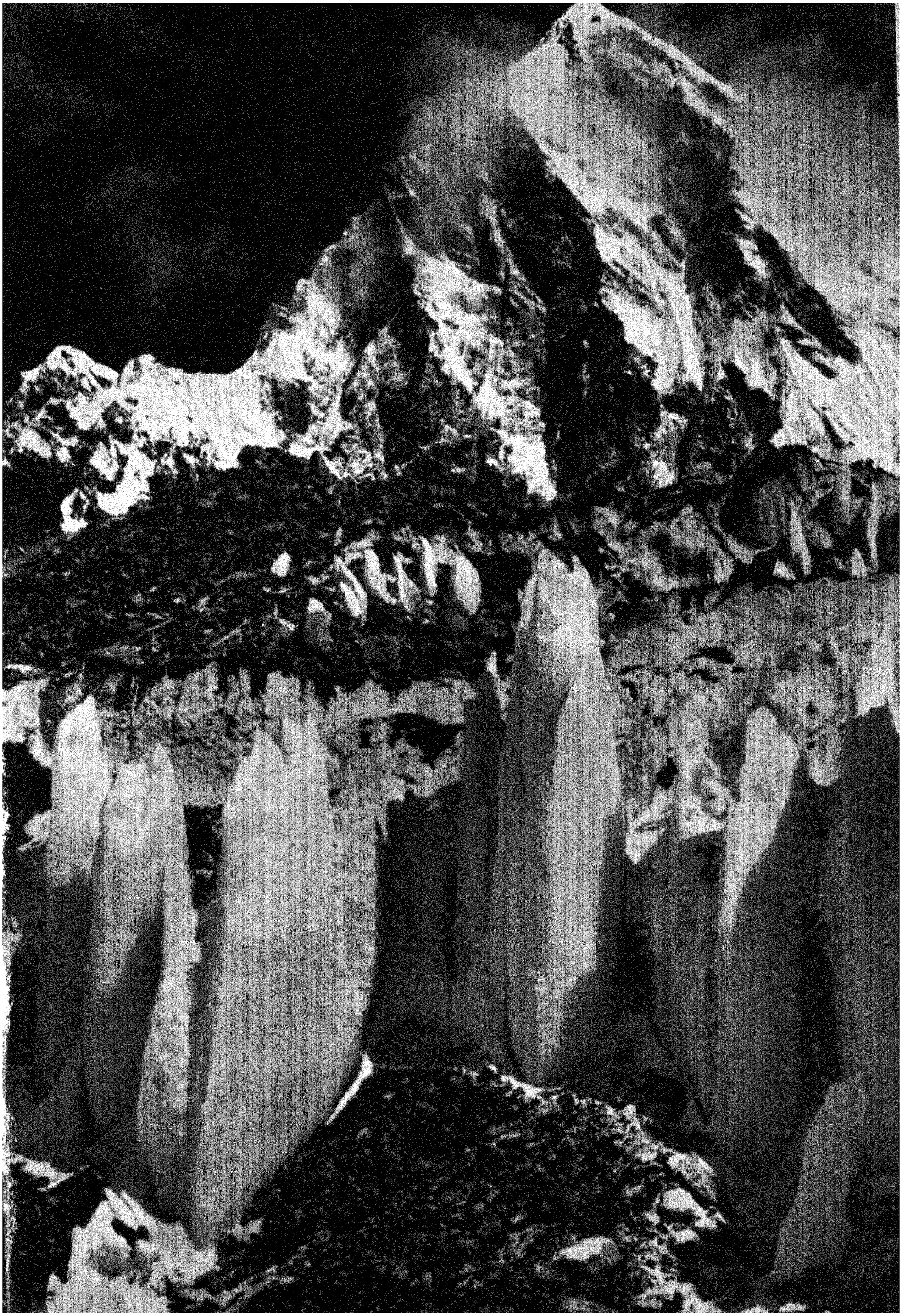
The descent to Camp II was astonishingly quick. We tried to communicate by radio with Camp I. The little transmitters worked badly when it was cold. We wanted the others to bring up juniper branches to serve as anchors for the rope-bridge.

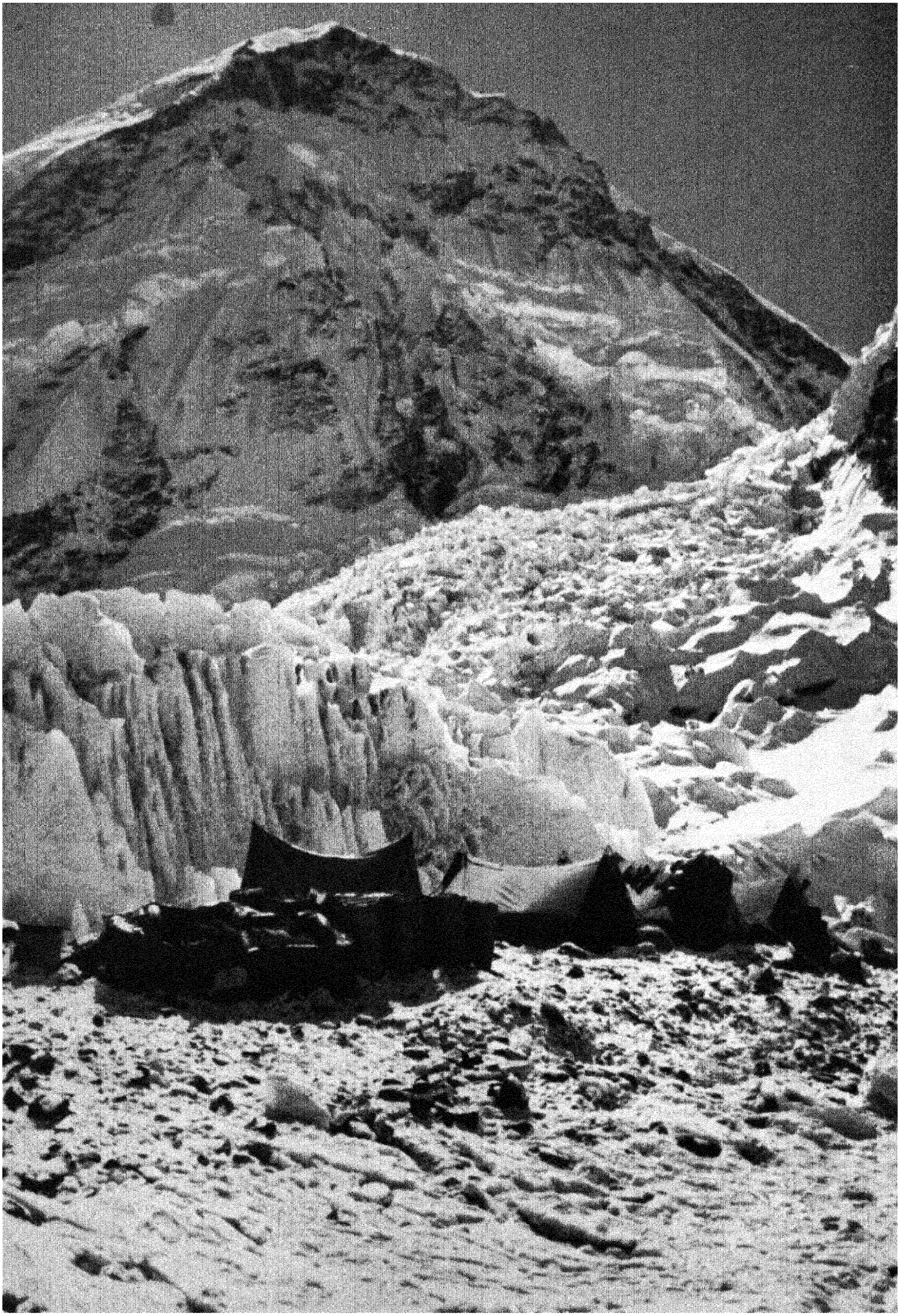
The next day, Asper, who was already familiar with the interior of the crevasse, also had the idea that he could swing across to the other side. The

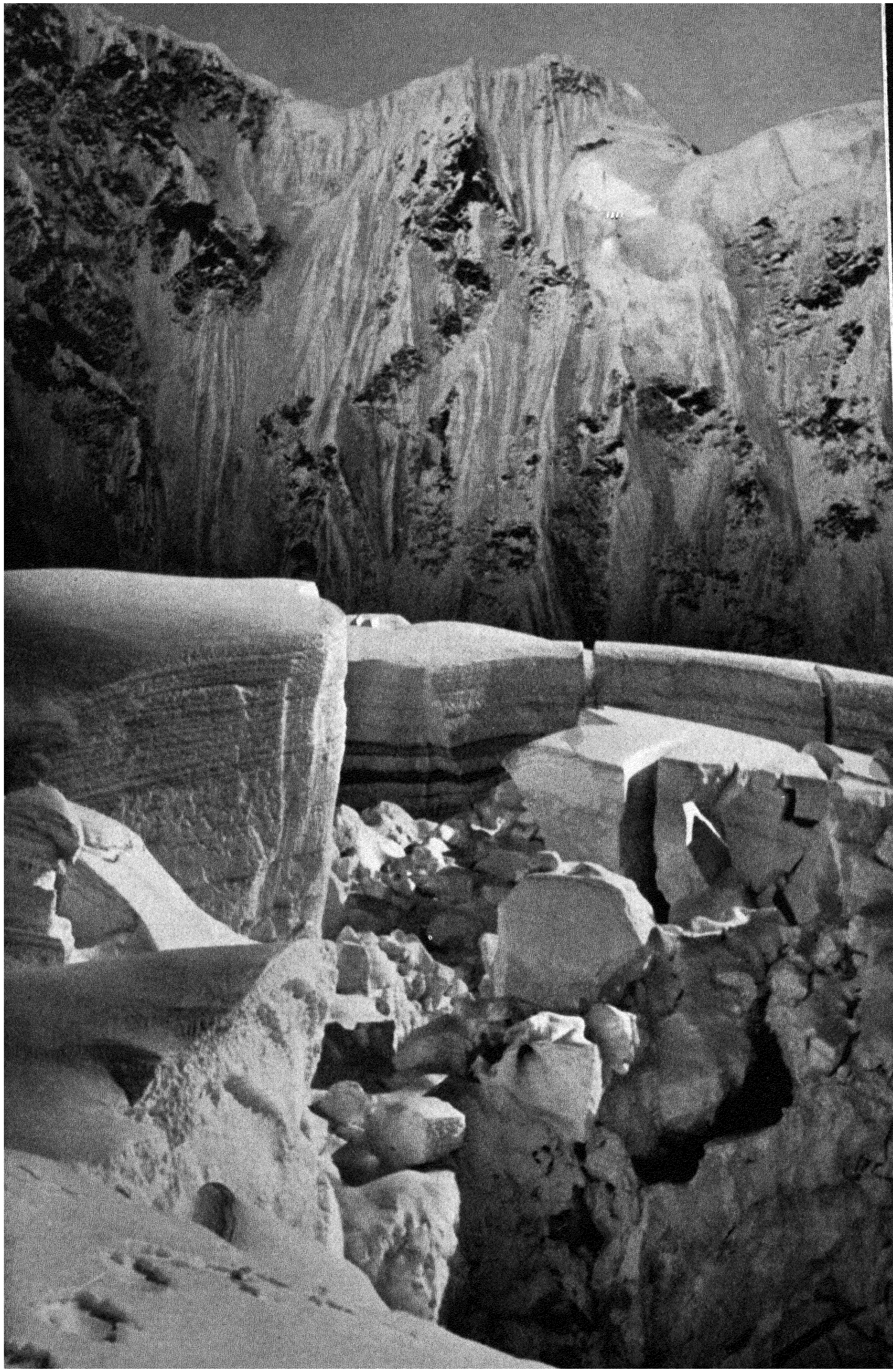
Plate 9: On the Khumbu Glacier: fantastic needles of ice (pénitentes, or pinnacles) formed by the effects of the sun and evaporation; some of them reach to 100 ft. high.

Plate 10: The "ice-camp" (17,225 ft.) on the curve of the Khumbu Glacier. On the right, the ice-fall. Behind, the western shoulder of Everest (23,580 ft.).

Double plate 11–12: The members of the Spring 1952 Expedition. Seated (left to right): Gabriel Chevalley (doctor), André Roch, Jean-Jacques Asper, Dr. Augustin Lombard (geologist), Alfred Zimmermann (botanist), René Dittert (leading climber). Standing (left to right): Leon Flory, Dr. Edouard Wyss-Dunant (leader of the expedition), René Aubert, Ernest Hofstetter, Raymond Lambert.







weather was fine. We started late. Then came the same exhausting forced march over the cones of dejection. On reaching the crevasse we set to work at once as if all our movements had been planned in advance.

After two fruitless attempts pendulum fashion, Asper descended to a depth of 65 ft. He succeeded in ascending a chimney of ice. Victory! The bridge was fixed; a glacier rope was quadrupled and anchored to wooden crosses buried 3 ft. down in the hard snow. Flory was the first to cross. Then we all tried. Ajiba and Sarki hesitated, but they succeeded and all of us went on further to assure ourselves that there was no other crevasse to stop us.

Progress was not easy. Many detours were necessary, but it seemed certain we were on the right road and that the way was now open to the foot of the slopes of the South Col.

Our emotion was great at being the first to tread the upper plateau of the Khumbu Glacier. The place was indeed quite fantastic. To left and right rose the very abrupt slopes of the western spur of Everest and those of Nuptse. At the far end the Lhotse Glacier glittered, while the peak of Lhotse itself stood out against a blue-black sky. Behind us rose the amphitheatre enclosing the lower Khumbu, Lho Peak, Lingtren, Pumori and other more distant summits.

We were happy to get back to Camp II, for we had conquered the séracs. Asper and I went down to Camp I to get some rest.

Besides being an exploration, a Himalayan expedition is a transport undertaking. At the start this transportation is done by train, ship and truck, and afterwards by coolie. From the base camp on, it is the Sherpas who have the task of carrying the enormous amount of material up the flanks of the mountain aimed at.

The Sherpas are the professional porters of the high mountain territory. Mostly they come from the Sola Khumbu region centring on Namche Bazar. These natives do great trade with Tibet, Nepal and India. Everything is carried on the backs of men, women and children. It seems as if there are no other beasts of burden in this part of the country. The roads are too steep and the pack-animals appear too difficult to feed.

During our approach march we had met and marched with several families, some carrying their hens in big bamboo cages laid across their baskets. Others had been to get rice and were taking it to their village where only potatoes grow. The whole family was loaded to the limit and were keeping pace with us. The father would carry close on 1½ cwts., the mother probably 1 cwt., while quite

Plate 13 (outside) : The labyrinth of séracs in the ice-fall of the Khumbu Glacier ; in the background, the ice-wall of the western ridge of Nuptse.

Plate 14 (inside) : Camp II (18,374 ft.) on the Khumbu Glacier, in the middle of the ice-fall ; behind, the flank of Nuptse (25,680 ft.).

young girls and boys of twelve to fifteen years would bear loads of sixty to ninety pounds. One can understand that those who pass their lives in carrying such loads find it quite natural.

The first Sherpas or high mountain porters were chosen from among the best elements in the Gurkha troops for the 1921 and 1922 reconnaissances and expeditions to Everest. Almost all were inhabitants of the valleys south of Everest. Gradually a tradition was established and these specialist porters have taken part in a great number of expeditions. They have travelled with Germans, Frenchmen, Italians, Swiss, British, Japanese and Indians. When they climb beyond 8000 m. (26,250 ft.), they receive the title of "Tiger", which means that they are particularly strong and resistant to altitude. Their villages are situated between 10,000 and 13,000 ft., which makes them to a certain extent accustomed to height. But that does not mean that they will stand up to altitudes of 23,000 to 28,000 ft. Some get pains in the head; others have vertigo, and so forth.

Our Sherpa party was of the highest order, beginning with Tensing, their sirdar (leader), who is at the top of his form, and who has taken part in so many expeditions that it is hard to list them. That he has been on four of the expeditions to the north face of Everest, will give some idea. In 1947, at Kedarnath (22,770 ft.), he was on the same rope with Dittert and myself. In the summital part the snow caked under our crampons and became very heavy. Dittert and I took off our crampons while Tensing took the lead, his crampons on his feet, and made the steps to the summit quite unconcerned.

There have been numerous accidents and great catastrophes among the Sherpas. My own Sherpa, Ajiba, was the brother of the one who, on Nanga Parbat in 1934, came down after a week of storms, when three Germans and five other Sherpas had died of exhaustion.

There are two things I admire in the Sherpas. First, their limitless amiability irrespective of person. Year after year, they travel with strange tourists: this one is miserly, that one is crazy, the third is a braggart quite unfamiliar with mountains, and so forth. But the Sherpa is always the same: on reaching camp, he puts up your tent, lays out your sleeping-bag, helps you to change your boots, prepares food—in a word, he does everything. If a storm breaks, he brings soup and hot tea into your tent while you are tucked up in warm bedding. When it snows or rains, he will give you his rainproof and let himself get wet. When it is cold, you shiver in your special sweaters, while the Sherpa is unaware of the cold, busy in his shirt alone. But all this is nothing yet, for the second thing I admire about the Sherpa is the way he handles the transport in the high mountain territory and especially in our case.

The day after the rope-bridge had been set up over the crevasse, Lambert, Aubert, Dittert and Chevalley went up with the Sherpas carrying 20 kg. loads.

To transport them across the crevasse, Lambert fixed a further rope on which the packages ran with the help of a slip-ring. The daily transport of the loads was thus organised quite simply. It was almost incredible and it was thanks above all to the marvellous Sherpas. In fact, every morning they left Camp I, at the foot of the séracs, wearing crampons, and in ropes of three or four. Right at the start the route they had to follow was easy, then it wound its way among the ice-towers, the accumulations of blocks and the crevasses. It was necessary to tack to right and left, to surmount walls, to pass below great blocks that were on the verge of tumbling over. Every day certain crevasses opened further, so that after some time the itinerary had to be changed, making new links and seeking new bridges. After 2½ hours, they reached half-way up the ice-fall to a sort of level space formed of great broken blocks. These were a little like blocks of houses in a city, but instead of being separated by streets, they were cut up by crevasses. On the first block were four tents, one of which was the kitchen; on the other were three for the Sherpas. This was Camp II.

From this point the ascent continued up a small couloir towards the left; then began a circuit among the fissures in the accumulation cones of avalanches and falls of ice from the ramparts of the western buttress of Everest. This circuit would not have been serious if it had only been a question of climbing, of balancing across bridges of ice and winding about among the blocks. What was disagreeable was that one was constantly exposed to slides of every kind. On one day, two ice-avalanches had fallen: the first a half-hour before the party passed, the second half an hour after. Which was just as well! However, it might have been that the party passed that spot half an hour sooner or later. So one luckily escaped from this dangerous zone and arrived by various detours at the crevasse where the bridge of ropes had been set up. The loads were put down and slipped across on the rope, one after the other, which took a fair amount of time. After that there was a further half-hour's march between enormous fissures, in which one could hide whole blocks of flats, to Camp III, situated between several crevasses on a sloping terrace. From Camp III we could see the far end of the upper Khumbu, closed by the slopes of the Lhotse, nearly 28,000 ft. high. This summit is flanked by a slightly sloping glacier. To the left are the couloirs which join the south-east col of Everest, while the south summit of Everest can be seen emerging above the western shoulder. To the south the glacier is flanked by the long and terrible north side of Nuptse. It is furrowed by steel-blue ice-couloirs and chiselled crests of snow which still cling to it. This site is not lacking in grandeur; it is even a little too wild.

Along this itinerary from Camp I to Camp III a considerable quantity of equipment and foodstuffs for twenty men had to be transported for three weeks. It had been divided into loads of from 20 to 25 kg. (44 to 55 lbs.), and the Sherpas brought up these loads every day. They leaped across the crevasses, balanced across the bridges, tacked about among the ice-towers, and balanced from one block to another, with extraordinary ease. We went with them as much as possible to correct the path if a block had broken up, and to give help if a load toppled into one of the numerous chasms. These portages were the more astonishing in that Sirdar Ang Tharkay, Shipton's chief porter, after having made the reconnaissance in the autumn of 1951, had said to Tensing: "You will not get a single load up to the upper Khumbu Glacier!" But on the 10th May, 1952, these séracs had been climbed every day since the beginning of the month by an average of six Sherpas. This made a total of sixty loads, brought to Camp IV. Those who have not seen and experienced this transport effort would not believe it. I and all my comrades were absolutely amazed by the performance, which was not ours but our Sherpas'. How they did it and how they stuck it remains incomprehensible.

Dittert and Chevalley were established at Camp III in order to push a reconnaissance to the end of the glacier and examine a site for Camp IV, as well as the slopes of the South Col. Then it was our turn to replace Aubert and Lambert and accompany the transports. While we thus relieved one another, the Sherpas themselves were always the same and their work was much more arduous. Then there was this passage, exposed to avalanches, that had to be done every day; that was most disagreeable. We often asked the Sherpas if they were afraid, but each time they said no, for they had recommended their souls to God and it was He who decided their fate. Always before crossing the bridge of ropes, Dawa Thondup murmured a little prayer. The biggest job was now done. The transport continued between Camp III and Camp IV, at the end of the glacier. Every day seven Sherpas made this trip in three hours.

Flory, Asper, Lambert and Aubert were established at Camp IV and were trying to ascend to the South Col. Dittert had had to return temporarily to base camp to put in order the last details regarding provisioning and to take down Sarki, who was suffering from malaria. From Camp I two young assistant-cooks, Migma Tensing and Gyalzen, who had vertigo and could not stand the altitude, every day brought up the loads to above the séracs at the bridge of ropes. They left them there and went down again. On returning from Camp IV, the upper Sherpas went to get them in the afternoon. They took them over the crevasse on the rope-bridge and brought them to Camp III.

If the rest of the expedition had not produced any further result, that of the transport of material across the Khumbu séracs, if it was not brilliant in itself, was a very fine achievement and made it possible to forge ahead. The first round was ours. Everest is big and protects itself with certain defences. The future would teach us who was the stronger. I think that our huge adversary had more chances on its side than we had on ours.

THE CROSSING OF THE GREAT CREVASSE

By Jean-Jacques Asper

On the 29th April, on a fine morning, a second party consisting of Roch, Flory, Hofstetter and myself, together with several Sherpas, left Camp II for a reconnaissance towards the top of the immense cataract of séracs. Our route was to be different from that chosen by our comrades, who themselves had tried to escape from the labyrinth up the middle of the ice-fall, while we chose rather the right bank of the glacier. Through a steep and narrow corridor between enormous towers of ice, we pushed forward towards the western buttress of Everest, then passed into a dangerous area which we named "Suicide Passage", because of the hanging séracs which threatened us constantly; but, full of determination and keenness, we advanced slowly, for the snow was deep and the altitude made itself felt. We were at 19,000 ft. Soon, after tacking about so as to avoid some gaping crevasses—which luckily provided us with a crossing every time, thanks to some rather frail snow-bridges—we were stopped by a zone of transverse crevasses running from Everest to Nuptse, so that we were abruptly faced with a problem which, at first sight, looked somewhat agressive. No bridge existed for crossing this notorious Great Crevasse, the last before we could reache the Western Cwm.

We halted to discuss the matter and each put forward a solution. A crossing might be practicable if everything was thrown in against Everest under this veritable roof of ice, but it would be much too dangerous. Moreover, we wandered about in the neighbourhood to see if there was really nothing to help us cross this last obstacle, for Shipton, the previous year, had been stopped in his reconnaissance by the same barrier in depth. The hours slipped by and we were left with the idea that there was only one way: to go down into the crevasse, climb the other side and set up a rope-bridge.

At 4.00 p.m. we were back at Camp II, where some Sherpas who had come up in the morning welcomed us with tea, very pleasant after a quite laborious day.

In the course of some sleepless moments that night, I said to myself that it was absolutely necessary to descend into this crevasse; furthermore, I wanted to try the next day to swing across pendulum fashion in the attempt to reach a knob of ice stuck to the farther lip of the crevasse, then, helped by my axe, I might succeed in reaching the other side.

During a radio talk to Camp I on the previous day, I had asked that the Sherpas who would be coming up the next day should bring us some ropes and bits of wood from which to construct the bridge. Our five Sherpas arrived early, luckily with all the requested material.

This time we left the camp with four Sherpas, for there were passable loads to take up; and in two hours, the track being in good condition, we were beside the crevasse. We hesitated no more. I at once secured myself with two ropes, one round the waist and the other under the thighs. A *rappel* was fixed with the help of two ice-axes thrust in up to the hilt; and everything having been tried out, I took hold of my *rappel* and left myself slip into the deep gap, the bottom of which could not be seen. Flory and Hofstetter held me. Having reached the level of this knob of ice, I found I was about twenty feet below my comrades. At this point the crevasse was perhaps thirteen feet wide, whereas at the surface it was twenty.

Keeping hold of my *rappel*, by clinging to crevasse wall I pulled myself out of the vertical so as to get a momentum which would allow me, by pushing off with my feet at the right moment, to get my body swinging in the direction of the knob.

Which is what I did, but unfortunately I had not quite enough movement and I could only touch my objective with my hands and feet, and was then thrown back violently against the wall of ice.

The first attempt had misfired; Flory and Hofstetter at once lifted me about a yard, the distance lost in the course of the swing, and I began again, but this time with greater impetus.

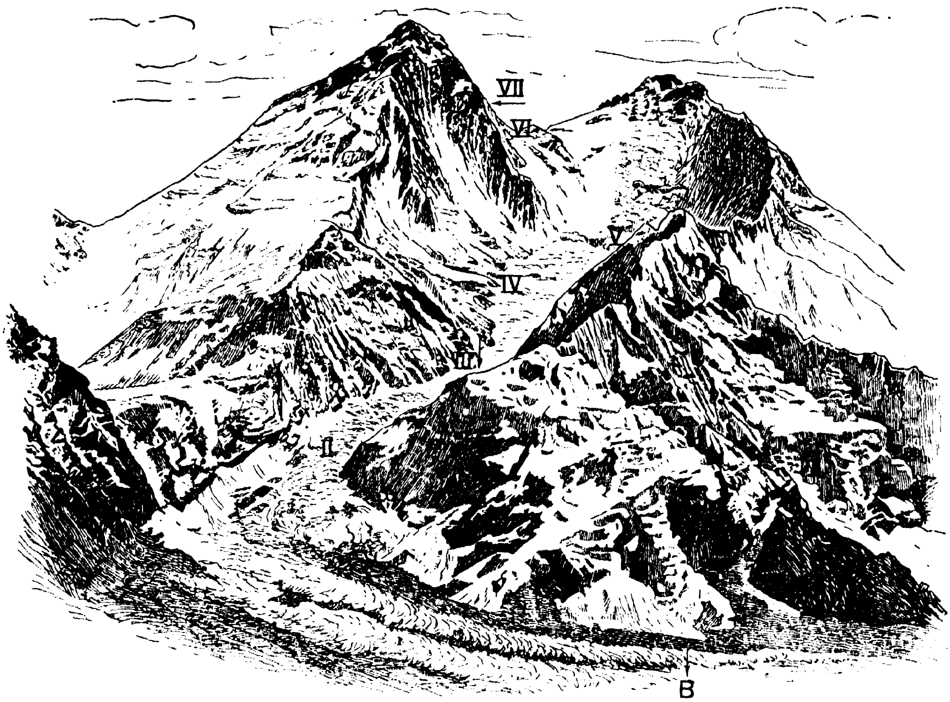
A second attempt and a second failure, the crevasse being much too wide for the length of the rope by which I was attached. I would need a much greater impetus for eventual success, but at a height of 19,000 ft. one cannot carry out the same exploits as in the Alps. So another technique was forced upon us.

Lower down, at about forty feet from the edge of the crevasse, there was a small snow-bridge. I let myself down, still on the *rappel* and stepped upon the frail bridge which was going to give us victory. There I let go of my *rappel* and crossed immediately; then, by a little snow-ridge I reached the further side of the crevasse.

There, in front of me, vertical, and even with an overhang in the middle, the wall rose up, entirely smooth with the exception of a few erosions which served me as natural holds.

With the help of my ice-axe I cut holds for my hands and feet, progressing slowly meanwhile, for I was breathing fast.

I reached the overhang and it forced me backwards, I cut good holds for my hands, but wearing mitts my hold was indifferent and it was, moreover, necessary to move quickly, for I felt that everything was slipping. Luckily, a few little



This bird's-eye view of the Everest massif was made by Otto Betschmann of Zürich on the basis of an oblique projection of the known altitudes in their comparative relation one to another, and was sketched from parts of aerial photographs. This eastward-looking picture is from an imaginary viewpoint about 3,000 ft. above Pumori. The terrain is by this means opened out, and allows the great mountains of Everest, Lhotse and Nuptse to stand out clearly, and makes it possible to see over the great upper Cwm and the wild Khumbu Glacier. B marks the base camp; the Roman numerals I–VII mark the sites of the higher camps.

stones, frozen into the ice, gave me a grip; I examined my way, I forced myself on and with a good heave I was up. I found difficulty in regaining my breath. Then there were a few more holds to cut and I reached a crack which allowed me, thanks to a more accomodating slope, to escape and reach the far side of the crevasse. I sat down and gasped; I was exhausted; the effort I had just put up had spent me.

It was now a question of making a bridge of ropes so as to open a praticable crossing for everyone and for the loads.

I untied myself from the two ropes which secured me, belayed them with my ice-axe so as to effect a temporary bridge on which Flory and a Sherpa crossed at once in the Tyrolean fashion, the latter hesitated for a moment, then, having commanded his soul to the mountain gods, he made up his mind.

On each side of the crevasse, two yards from the edge, a big trench was cut so as to reach a bed of compact snow where the moorings of the bridge, consisting of wooden cross pieces, would be sunk.

At the bottom of each trench, four T-shaped troughs, converging to a point, were prepared (the vertical strokes of the Ts towards the crevasse) to serve as beds for the ten millimetre hemp rope which spanned the crevasse four times.

At the two extremities and at the three turns of the rope (that is, each time it turned back on itself), wooden cross-pieces were attached by cord and each laid out in the horizontal stroke of a T. Then each piece of rope being made taut, two bindings were made to hold them all together. Afterwards the trenches were refilled with snow which was rammed carefully down, and with the frost the moorings were sealed into the ice for ever.

Two days later, Lambert, Aubert and some Sherpas made a second bridge, just beside it, to facilitate the crossing.

Thus established, the bridges stood up to every load and to bad weather, which is no small consideration in the Himalayas.

Disregarding the frequent crossings of sahibs and Sherpas, two and a half tons of goods and materials were brought over for the upper camps.

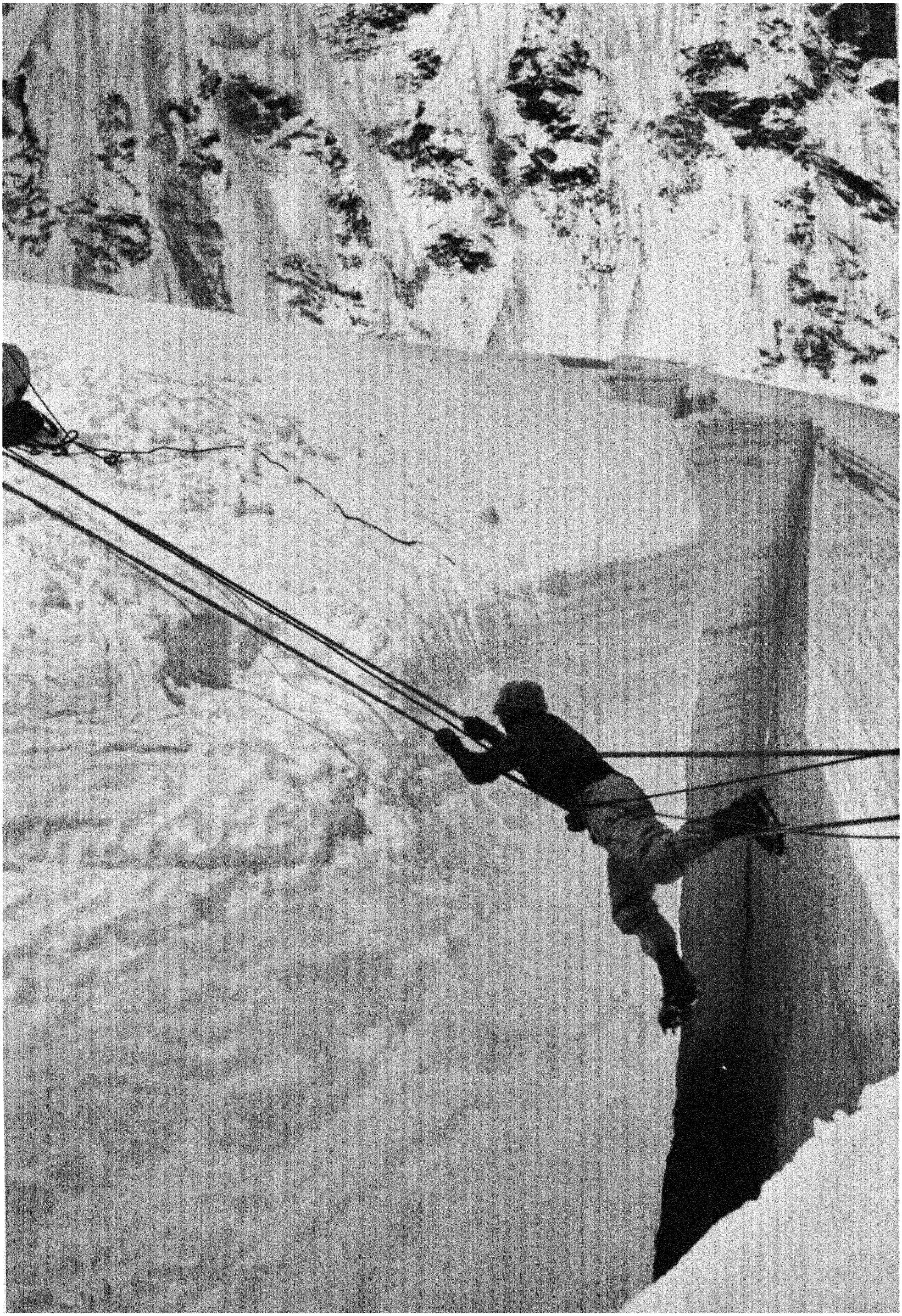
While all the men crossed in the Tyrolean fashion, the loads (20 kg.) were fastened on by a slip-ring to one of the bridges and hauled over with the help of a rope.

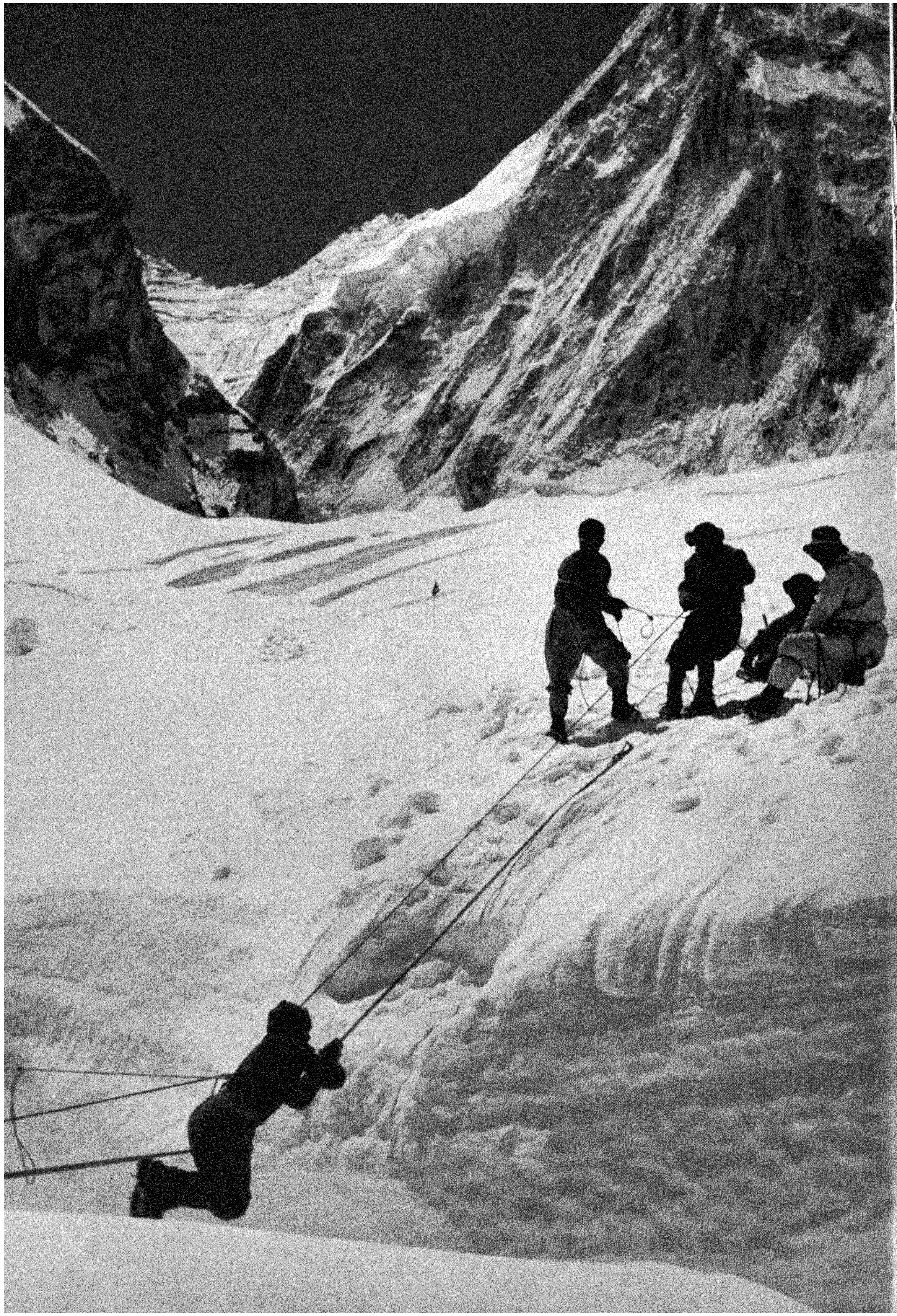
In very little time the Sherpas acquired great skill in the manoeuvres necessary for transporting the loads and the time required for getting everything across was the minimum.

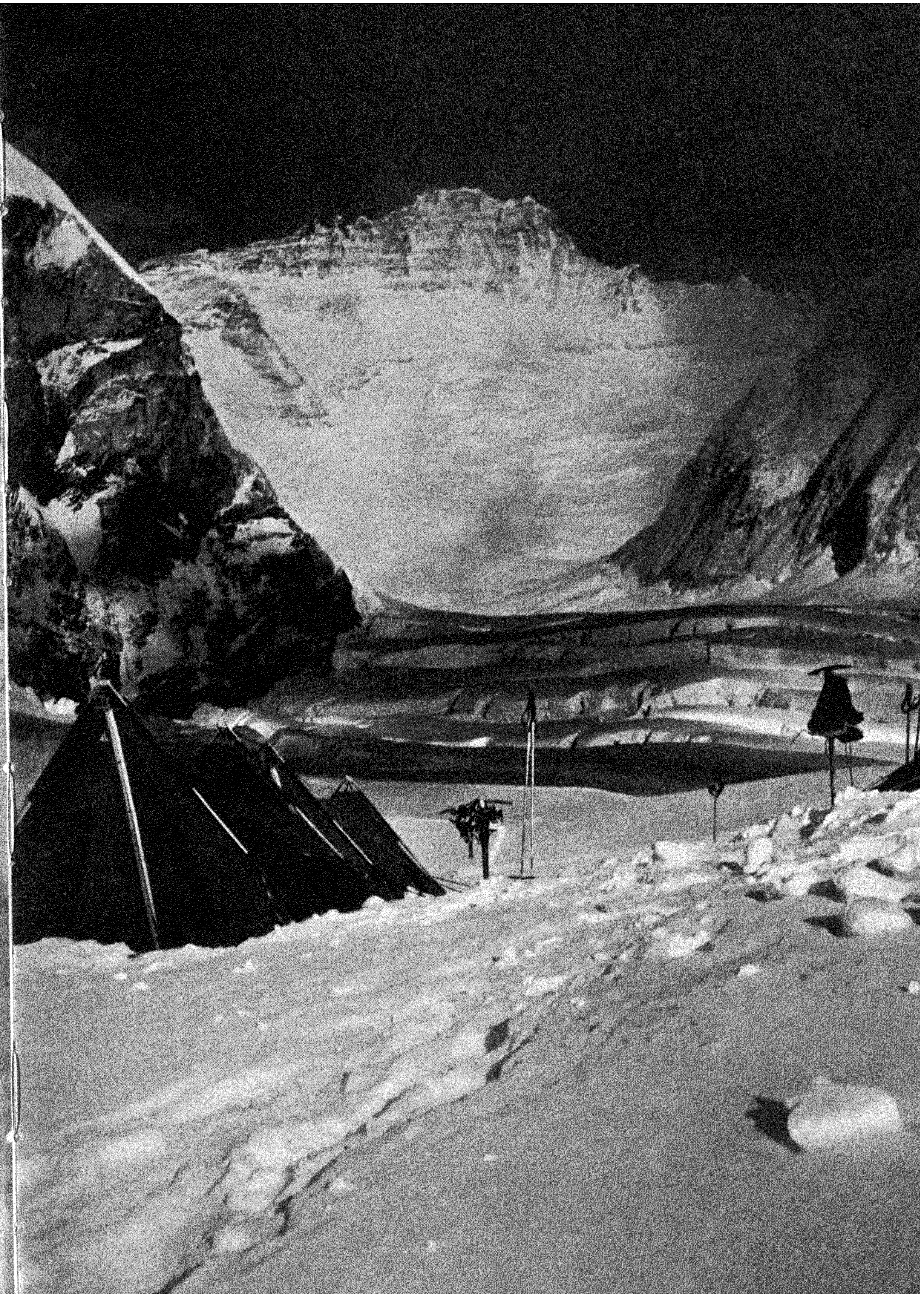
We were a little in fear of seeing the crevasse open up and the ropes break; but thanks to extraordinary luck and constant testing by the Sherpas, when we retreated towards the valleys were found our constructions still there and intact.

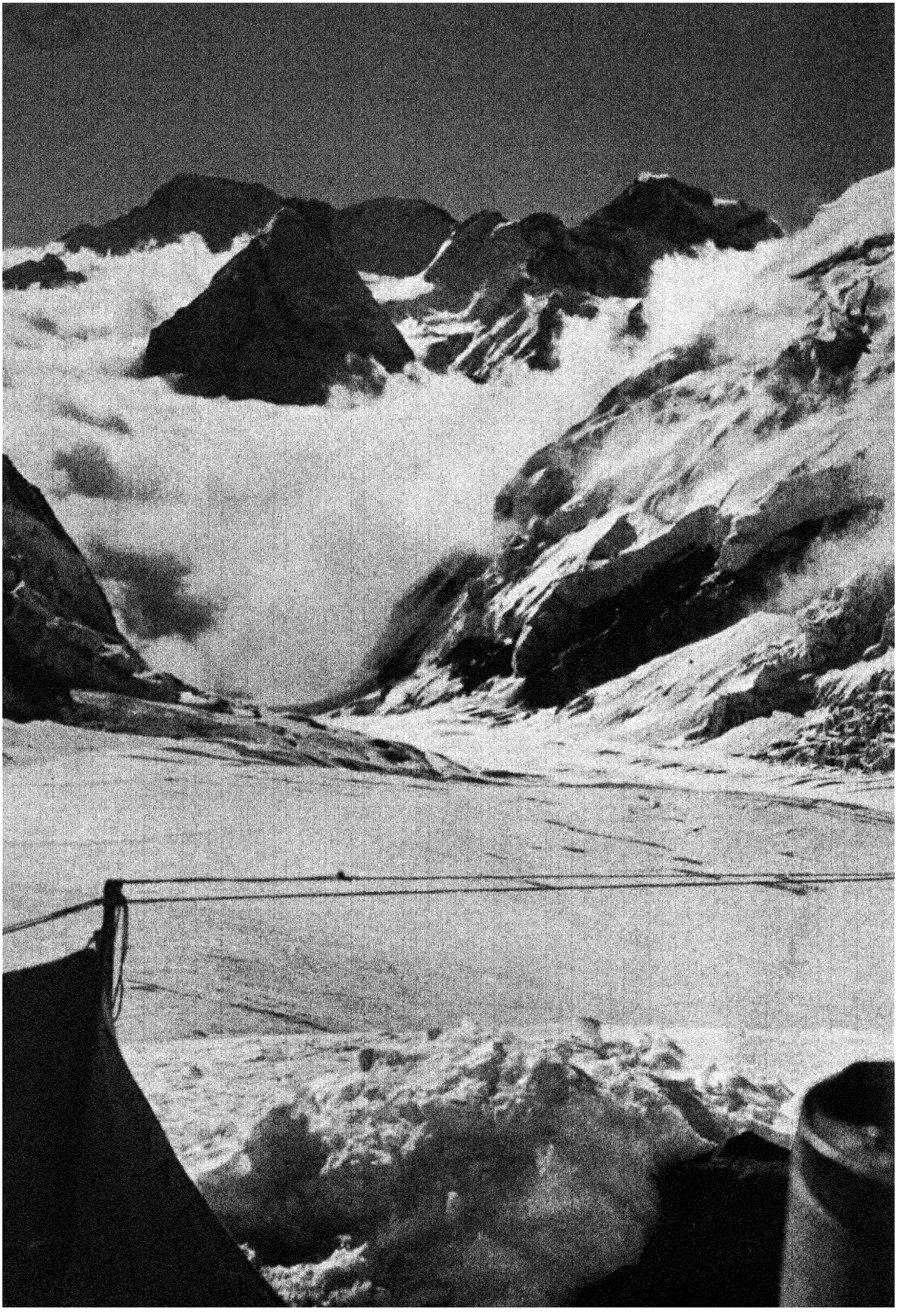
Plate 15 : The rope-bridge fixed across the great transverse crevasse at the upper end of the séracs ; a Sherpa is engaged in crossing it.

Plate 16 : The Sherpas learning to cross by crawling along the rope-bridge ; in the background, the rocky portal of the Western Cwm.









THREE WEEKS IN THE VALLEY OF SILENCE

By Léon Flory

The Valley of Silence is what we called the upper part of the Khumbu Glacier. This Western Cwm is a sort of immense plateau, about 4½ miles long and 2 miles wide, bounded by enormous walls, towering about 10,000 ft. above us. On the left was the western flank of Everest (29,002 ft.); on the right, Nuptse (25,640 ft.); and at the far end, Lhotse (27,892 ft.). This gigantic combe, shaped like a horseshoe, represents in our arduous march towards Everest, a period of quiet between two major obstacles, the perilous crossing of the ice-fall and the exhausting ascent of the South Col.

On the 6th May Hofstetter, Roch, Asper and I were seeking a site for pitching Camp III after having crossed, by the bridge of ropes, the famous crevasse which had prevented access to the plateau. A ridge of snow, 200 yards in front of us, closed our view. What should we find beyond it? In fact, two large crevasses, which we worked round or crossed on snow-bridges, slowed up our advance. Still further crests and further crevasses showed up everytime we wanted to hurry forward to catch sight of the mysterious combe. Uncertainty, which is the whole charm of adventure, made our hearts beat faster. With mad delight we ploughed through virgin powder-snow, despite the arduous labour this represents at such a height. No trace of life was there; we were quite alone; the creak of the trodden snow was the only sound in the great silence.

Our goal was reached. The combe was open to our eager eyes in all its wild splendour. A dantesque sight was this lost valley, surrounded by the giants of the Himalaya. On the right was Nuptse, an immense wall encrusted with crystalline ice, forming hundreds of small ridges glistening in the sunlight; to the left, the western flank of Everest, a 10,000 ft. rampart of black rock with streaks of yellow, the powerful defence of the roof of the world. At the far end of the combe,

Plate 17: Camp III (19,358 ft.): across the Western Cwm ("The Valley of Silence") can be seen the flank of Lhotse (27,890 ft.). To the left, beyond the rock nose, the spur continues towards the South Col. On the flank of Lhotse, closed by a wall on the upper third, the Lhotse Glacier descends towards the Western Cwm.

Plate 18: Camp V (22,639 ft.) on the Lhotse Glacier; across the Western Cwm, Pumori (23,190 ft.) can be seen, encircled with clouds, and Gyachung Kang (25,910 ft.).

closing this imposing amphitheatre, was Lhotse, an ice-slope up to about 26,000 ft., ending in rocks and snowy ledges.

Amazed by all these new impressions, we set out in quest of a favourable site on which to establish Camp III. After having strayed in many directions, tramping along the edges of crevasses and crossing snow-bridges, we chose a spot which seemed safe, sheltered from avalanches and stone-falls—always to be feared—coming down from the vertiginous walls surrounding us. To instal a camp at nearly 20,000 ft. is easy to talk about, but is in reality quite fatiguing. We were not yet quite acclimatised. So we erected our little yellow tents on a kind of platform, surrounded by wide, deep crevasses which could engulf a cathedral. We had the impression of being on a veritable raft. After this labour, and while awaiting the approach of night, we enjoyed the splendid view before our gaze. We felt ourselves filled with a great happiness, for we were convinced that we should be able in the coming days to continue to the end of the valley without too many obstacles. We were already so high that we overlooked numerous passes and summits. Clouds rose from the lower part of the glacier. Everything seemed to us unreal and mysterious; there was not a sound and a great peace reigned. We were lost in the heart of these mountains, far from everything, and we felt deeply how small we were compared with this fantastic aspect of nature. The sun was about to vanish; one by one the summits changed colour and progressively darkened. At once the temperature fell steeply. During the night it varied between 18 and 36 degrees of frost (F.). We prepared to sleep. To get into our low tents, take off our deep boots—which for some days had been indispensable to guarantee us against the cold—and to slip into the double sleeping-bags, were so many exhausting operations. The small dimensions of our shelters hampered our movements, and the sight we presented would have been quite diverting to others. To prevent our boots from freezing we buried them in our sleeping-bags, a precaution that proved very useful.

Once well installed, with our sleeping-bags fastened to our chins, with woollen caps protecting our heads and ears, we experienced a wonderful well-being and hoped for a good sleep. Alas! the wind rose; the creaking of the glacier, the whistle of stones falling from time to time, and the lack of oxygen, made this night (and how many others!) very disturbed. I tried every means to fall asleep; I counted sheep, classified them, grouped them, counted my heart beats and my respirations, then, after laboriously reaching ten, I felt that I lacked air, that I was suffocating, and was obliged to sit up. Finally, after many hours, I decided to swallow a sleeping-tablet and often, later, a second, for it was absolutely necessary to sleep—the further efforts of the morrow awaited us.

How can I express what we felt in the morning, when we woke? We opened our tents—how cold it was!—and the enchantment of the rising day struck our eyes, an unparalleled sight: at each moment the high summits and the immense mountain walls changed colour, and with magnificent, incomparable tints nature's great magician showed us all the riches of his palette.

One sensed that the sun was quite near. Our camp was lost in the heart of this awe-inspiring beauty. Light mists floated around us, rising and disappearing. The first rays of the sun drew close. It was still very cold and we waited to get out of our sleeping-bags until the sun had reached us. Immediately the temperature rose; how great was our well-being! We were happy. The Sherpas prepared excellent cocoa and it was much appreciated. These strong fellows compelled our admiration; always good-humoured, they seemed not to know fatigue. Their main task was to transport large quantities of material and foodstuffs, and to make it possible for us to move without failing to the goal we had set.

It was now a question of establishing Camp IV. Our comrades came up from the lower camps and the reconnaissance parties were rapidly organised on the vast Khumbu Glacier. Unfortunately, the atmospheric conditions deteriorated and we had to be careful to take flags, which we planted in the snow, to make it possible for us to find the route again in bad weather among these large crevasses.

On the 8th May, Asper, Chevalley and I established Camp IV at about 21,300 ft. In the fresh snow the march was laborious. On returning to Camp III we found our friend Roch constructing an igloo, which proved welcome, for in the wind and the snow it was not comfortable to eat outside, nor in our little tents. We helped our friend to finish the igloo and were happy to slip inside, absolutely sheltered from the tempest which was rising to a crescendo.

On the 9th May, Camp IV was finally settled and organised. On the 10th May, Asper and I reached the base of the Lhotse Glacier and of the great couloir issuing from the Lhotse ridge. In these regions the wind sweeps into the far end of the combe in gusts at a velocity of at least 75 m. p. h., and beats against the flanks of Everest, producing an infernal din, like that of an express train approaching and then drawing away. This wind was so strong that on several occasions we saw avalanches, which had been detached from the formidable wall of Nuptse (6500 ft. high), literally stopped in their tracks, blown back and then dispersed in immense clouds of snow. A truly tremendous sight.

Distances in this combe were such that they misled our calculations. It therefore proved necessary to establish an additional Camp V at above 22,600 ft., before attacking the great slope leading to the South Col. On the 14th May almost the whole climbing party was assembled at this camp. The cold was very great in the morning, for the sun only appeared at nine o'clock. We were at the very foot of Everest. The weather improved and the evenings were unforgettable. We had a view upon Pumori, a beautiful mountain which dressed itself in light and shining clouds at the setting of the sun. The only sign of life which had appeared to us in these solitudes was a migratory bird which tried with great difficulty to rise along the walls of Lhotse. It sought to cross this terrible barrier at the far end of the circle of mountains. Did it succeed? We followed it with our eyes as long as we were able.

The weather improved; it allowed us to reach the South Col and to make a reconnaissance higher up, towards the summit of Everest. Unfortunately, the monsoon was near; it shattered our attempts and transformed the Western Cwm into a vast trap. On the return, we found Camp III unrecognisable. The melting of the snow had transformed everything into hollows and humps; a few columns of ice and some boxes were the only vestiges of the igloo, constructed three weeks earlier. This camp would therefore have been no help to us had the incident I am about to relate ended badly.

I was on the way from Camp IV to Camp III in company with three heavily laden Sherpas. Plodding through the melting snow I found myself facing a crevasse; I tested the firmness of the snow-bridge with my ski sticks. It held. With infinite precaution I ventured one foot on to the bridge, but it collapsed with an apalling fracas. I tried some distance away on another bridge; it, too, gave way under my foot, making me lose my balance. Distracted, I plunged forward and so found myself above an unfathomable abyss, my feet against one of the lips of the crevasse and a shoulder against the other—a terrible position. Luckily for me, I had not let go my sticks. I found them an invaluable aid in escaping from this trap. I planted them against the wall where my crampons were achored and pushed with all my strength. By superhuman effort I made hardly perceptible progress, until I was in a better position. My feet had abandoned their hold; with my hands I clutched at a few asperities and pulled myself out of the danger zone gently, without any abrupt movement. To cross such passages is less than agreeable; the Sherpas on one side and myself on the other, we searched for a safer bridge. This kind of incident was repeated, alas! with less luck, resulting in a casualty among the Sherpas.

On the 3rd June all my other comrades succeeded in leaving the Western Cwm in the middle of a tempest.

So the Valley of Silence did not always deserve its name. It was no longer the scene of great exploits; during our stay it was relatively calm, but a deceptive calm between two battles. Nevertheless, we keep the memory of its cold and imposing setting, of its avalanches, of its companion the wind, and of its sunsets; and to these is added one imperishable memory of extraordinary worth—the expectation, the hope of a great success.

This hope, this faith, are among the essential qualities of a mountaineer and especially of a Himalayan.

THE STRUGGLE FOR THE SOUTH COL

By René Dittert

On the 10th May, after making all necessary arrangements for the transport of equipment and provisions, I set off once more along the track leading to Camp III, a sinuous path that brought one beyond the séracs into the Western Cwm. This was the last time that I crossed, on the ascent, the ice-fall of the Khumbu Glacier, for now everything was ready for the push to the South Col and to Everest itself. Mingma Dorje[1] went with me. Heavily laden, we progressed but slowly; the heat was intense.

Wyss had given me his final advice and had begged me to keep him informed of the progress of the operations. In agreement with him, we decided that we must be out of the Cwm during the first days of June, before the monsoon broke.

It was a curious thing that on this day, alone with Mingma, as I crossed the séracs once more, my feelings were softened and I asked myself if perhaps we had not made too great a demand upon our men in breaking through this chaos and making a path around these towers, these menacing and strangely shaped icicles; and it was in an abstracted state of mind that I went forward through the cataract of ice. From time to time I looked at Mingma, who was marching strongly. But as I mused I became simultaneously aware of the superhuman labour expended by our Sherpas, who day after day had threaded their way through this labyrinth with their loads, then rapidly slipped between the crevasses of the dangerous zone swept by continuous avalanches from the buttress of the western ridge of Everest, had thereafter crossed the great crevasse by the rope-bridge and continued at last towards Camp III, which was sited on a cube of ice, surrounded by yawning crevasses, blue and green, and big enough to swallow a cathedral.

When I reached Camp III that day, I had had enough. The heat which had weighed upon us only a few moments before had quickly given place to an icy wind. Breathing heavily, I dumped my sack and let myself sink on to a box; quite soon, however, a cup of hot tea revived me. I was once again with Chevalley, Hofstetter and Roch. Our other comrades had left to occupy Camp IV at 21,160 ft. They were going to make the first reconnaissances of the South Col.

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[1] Fatally injured by ice-fragments in the Lhotse couloir on the 31st October, 1952, during the autumn attempt of the Swiss Expedition to Everest.

Shortly after my arrival, a party of Sherpas came in from Camp IV and gave us this short message: "Have pushed forward to couloir of South Col. Distance Camp IV couloir too long. Indispensable establish Camp V foot of Lhotse Glacier. Tomorrow Aubert-Lambert climb with tent on new attempt. Signed: Flory-Asper." It upset our plans, but that was that! We had thought, in fact, of establishing Camp V at the South Col itself.

Scarcely a few days before, we had been calculating our chances of reaching the Western Cwm; now we were already thinking of those we had of reaching the South Col. They were not great and we guessed the grim tenaciousness we should have to display right up the slopes which have an angle of forty degrees and a depth of more than 3600 ft.; and we also foresaw the struggle which would unfold between 23,000 and 26,000 ft., that is to say, at the critical heights. But now that the major obstacle rose up before us, and its slope seemed to change with the differences in light throughout the day, so that we passed from certainty to hope and thence to despair, we understood better the deep impression it had made upon Mallory when he arrived at the "Lho La" and was the first to set eyes on the Nepalese face of Everest. This face did not seem to him attractive and he wrote that there was little chance that the gap between Everest and Lhotse could be reached from the west. Now that gap was none other than the South Col which we had to reach if we wished to open a way up this side of Everest.

On that day, the 11th May, only the Sherpas ascended to Camp IV with the loads; we remained at Camp III awaiting developments. Throughout the day we watched the bottom of the South Col through glasses. At 13.00 the Sherpas had returned; they seemed tired. They confirmed that Aubert and Lambert had gone to establish themselves with a tent higher up. Eventually, in the evening, we discovered their tiny gold-coloured shelter shining in the level light of sunset.

During the night the storm rose, the wind blew fiercely and snow fell abundantly.

In the morning the blizzard continued; no one moved, and in the tent we awaited the end of this sudden and unexpected attack of bad weather.

At nine in the morning it was still snowing; everything was white. There was about a foot of fresh and powdery snow. What were our comrades doing up there?

A sudden break in the clouds, through which the sun momentarily glinted, allowed us to see our friends' tent, 2½ miles away, as well as a long stream of snow which, falling from the north ridge of Lhotse, had exactly followed the couloir we would have to use, at least in part. A bad omen? We did not think so; it was at any rate a call for care. A marvellous evening succeeded the storm: great rose-coloured clouds clung to the flanks of Pumori, while scraps of gentian-coloured sky appeared behind the Khumbu La. We made our arrangements for the morrow, the 13th May.

We all went up to Camp IV. In the lead, Chevalley and Hofstetter made the track; we followed with the Sherpas. The snow was very deep. We congratulated ourselves on having taken the precaution of marking out the whole route with stakes, for we thus lost no time in refinding it. At 12.15 we were at Camp IV, slightly lower than the point we had fixed on the 6th May.

Lambert and Aubert were there; we were thus relieved of a great anxiety. At seven that morning they had retreated so as not to be blocked by falls of snow. Flory and Asper discussed their attempt: they had faith in the ice-couloir and thought that it would be necessary to cut many steps to prepare it for the passage of laden Sherpas.

It was now a matter of losing no time, for every day the threat of the monsoon became clearer.

On the 14th May we ascended from Camp IV to Camp V. The temperature was extremely low, about 18 degrees below zero C. (approx. 32 degrees of frost F.). We wished to settle at Camp V and not descend from it except for the final return. When we arrived there, it was still early, but too late, however, to get busy in the couloir and proceed higher. We prepared the platforms for the tents and pitched the camp properly. Asper, Aubert and Flory, after making the track so as to save us from fatigue, went down to Camp IV. Lambert, Roch, Tensing and myself remained at Camp V.

The equipping and provisioning of the various camps pre-occupied me, but slowly the high-altitude units[1] arrived. We would only launch the attack towards the summit when we were firmly established at Camp V. It was on that camp that the establishment of the camp on the South Col would depend; there, too, it would be possible for those descending from the various reconnaissances to restore themselves and get themselves into condition again as quickly as possible. It should not be forgotten that Camp V was at 22,640 ft. and therefore at the dividing line between acclimatisation and deterioration. Life there was harsh; a violent wind blew permanently and sprinkled us continuously with powder-snow torn from the flanks of Everest and Lhotse. But the evenings there were wonderful and, before taking to our tents, we would lift our eyes to the sombre mass of Everest, or a little lower, to where, at 25,920 ft., at the top of a wall of sapphire-coloured ice, was the South Col. We sought a route up these slopes, and up the dangerously inclined couloirs, down which avalanches fell, as well as stones torn loose by the wind. What would be the best and safest itinerary?—the couloir leading directly to the col, dominated by the south wall of Everest, or the rock spur[1] which shows up to the left of the great couloir, or the glacier on the west face of Lhotse[2]? We were puzzled and hesitant, but we thought that perhaps on the next day the matter would be settled, for we were going to launch the first reconnaissance. The sun sank quickly to the horizon and the wind became icy. At six in the evening we had already taken to the shelter of the tents for our evening meal—pemmican, biscuits, sausage or bacon, and at the end a cup of tea. The nights were fine, though the wind, which howled and raged at the tents, became a painful obsession to which we accustomed ourselves only with difficulty.

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[1] For each camp there was one major unit, comprising tents, alpine equipment (sleeping-gear was an individual matter), foodstuffs, a heater and saucepans, petrol (as far as Camp V, higher it would be solid fuel), petards and signal rockets, explosives for releasing avalanches, etc. A camp could only be occupied when the major unit was completely there. Then came other units, composed mainly of foodstuffs and petrol.

On the 15th May, at an early hour, Tensing came into the tent with a cup of tea. We were going to climb towards the South Col. Outside the wind was still blowing; there was about 36 degrees of frost (F.). To dress, put on our high-altitude boots of reindeer skin and slip into our outer garments of Protector cloth, all inside our little tents, was very laborious indeed; but to tie on our crampons and rope up in the ceaseless morning blizzard were even more arduous tasks. Everything had to be done quickly, for our fingers could only bear being uncovered for a few moments; the frost acted at once, and to get warm again at these heights was as good as impossible.

We left at 6.45. A broad and level space, overlooked by instable séracs, gave access to the Lhotse Couloir. Lambert and Tensing were already involved in it; they had tended too close to the séracs and had come upon ice. Roch and I diverged and along a diagonal reached the middle of the couloir. The wind-blown snow allowed normal progress for the altitude. But what should I say of this rate of progress? Ten or twenty steps and then... halt! For each step at least two breaths! Higher up our progress was even slower, and the snow was deeper too.

Our confidence was not great; the surface of the snow was crusted by the wind and below the crust were eight to twelve inches of powder-snow adhering badly to the ice. Such conditions were favourable to slips; we also anxiously followed with our eyes the impressive course of the lumps of snow detached by the numerous kicks we fond necessary in making a step—a fine glissade that would take us to the Khumbu Glacier after jumping the *bergschrund*, which was at least 150 ft. deep!

For three long and monotonous hours we went on up. We repeated the same movements hundreds of times, like automatons. We were spared neither by the

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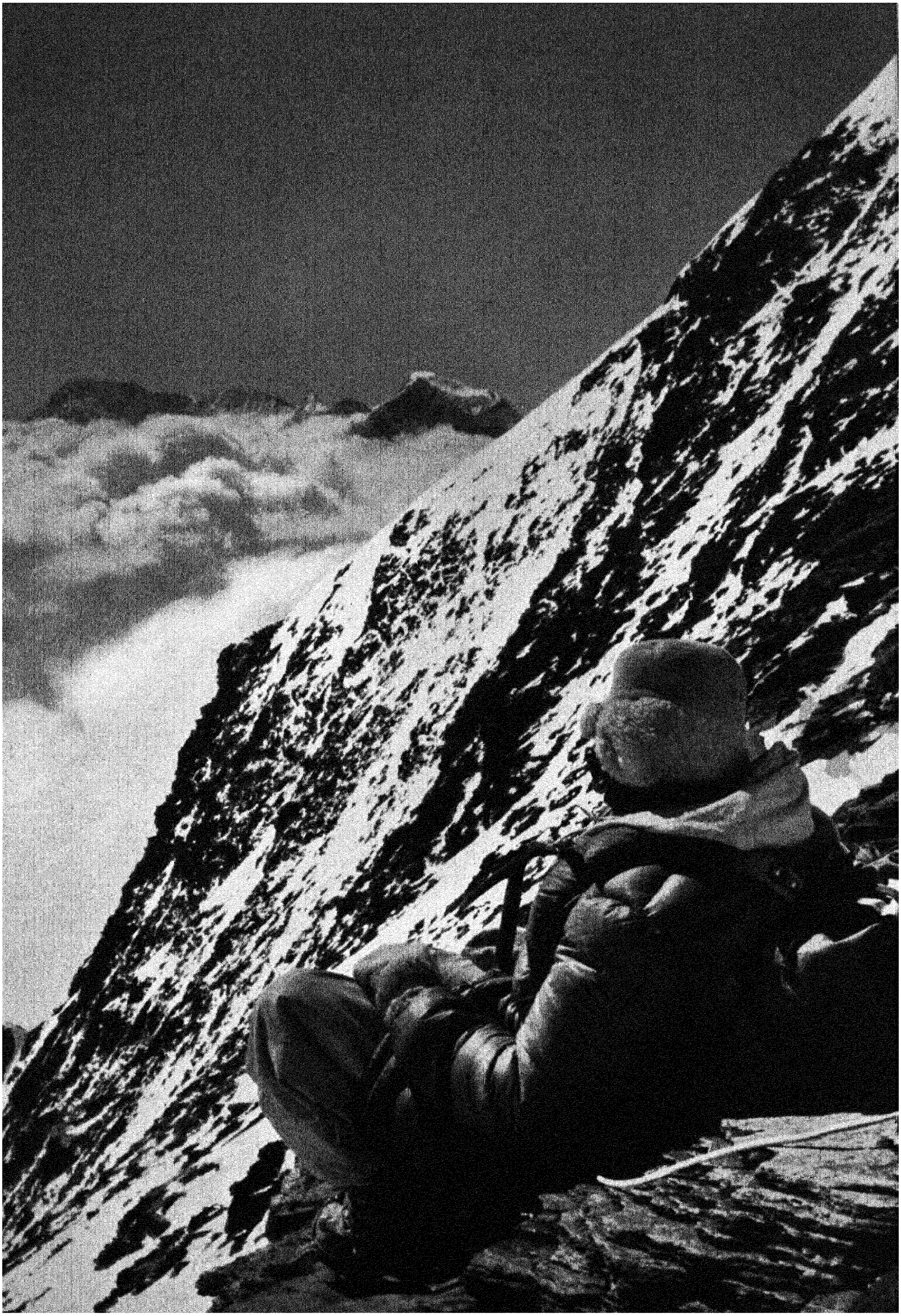
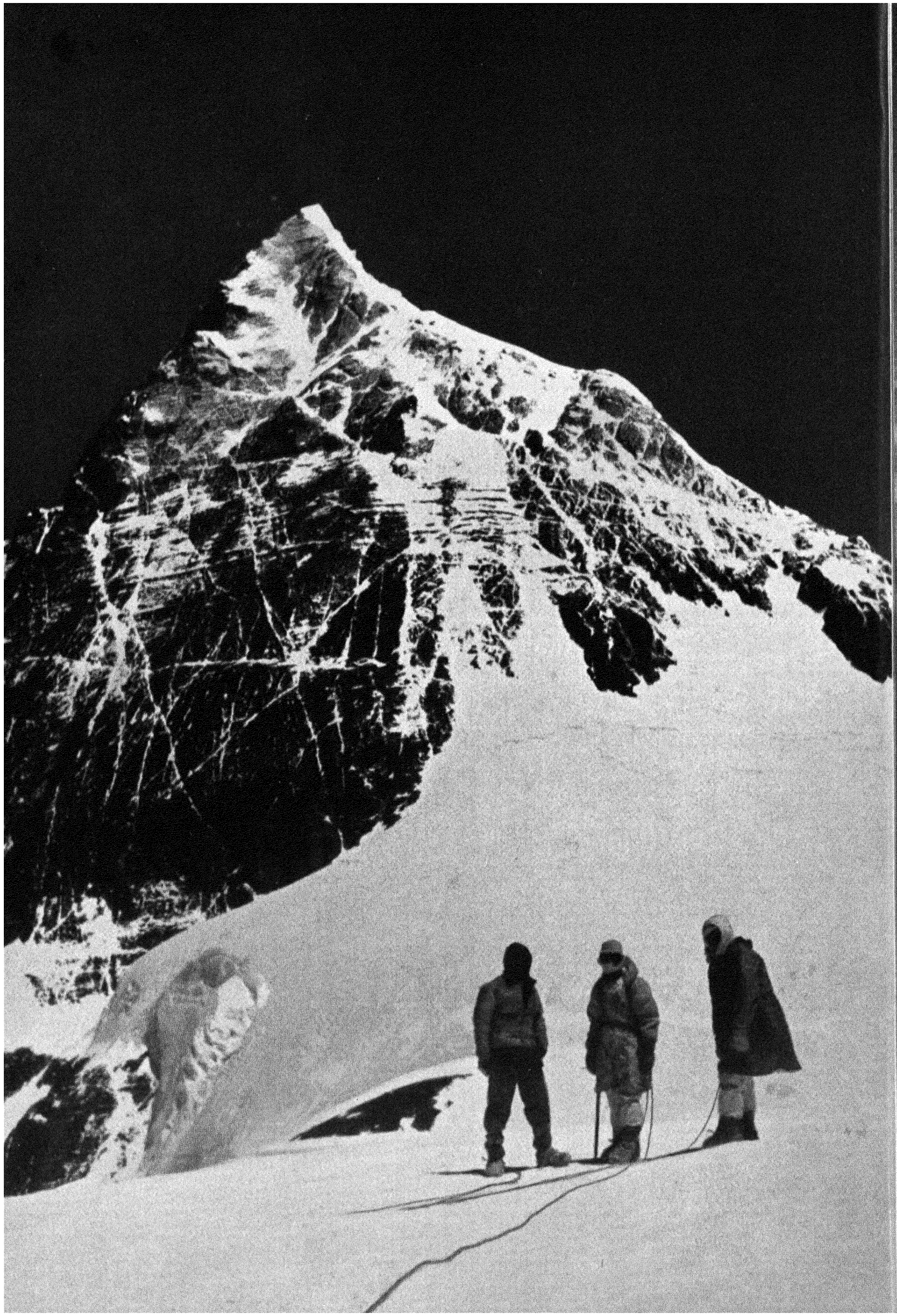
[1] Called the "Eperon des Genevois".

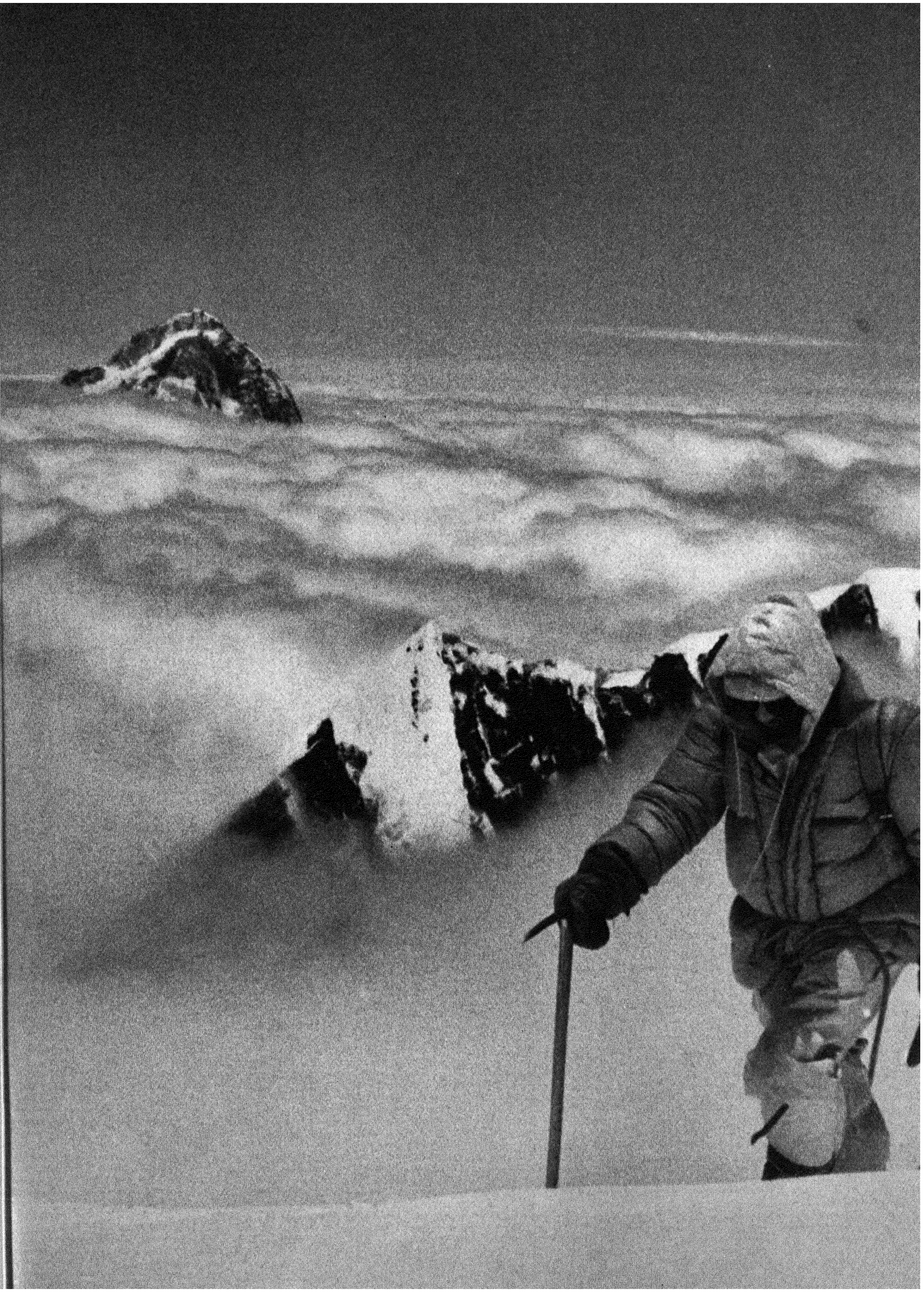
[2] Called the Lhotse Couloir and Glacier.

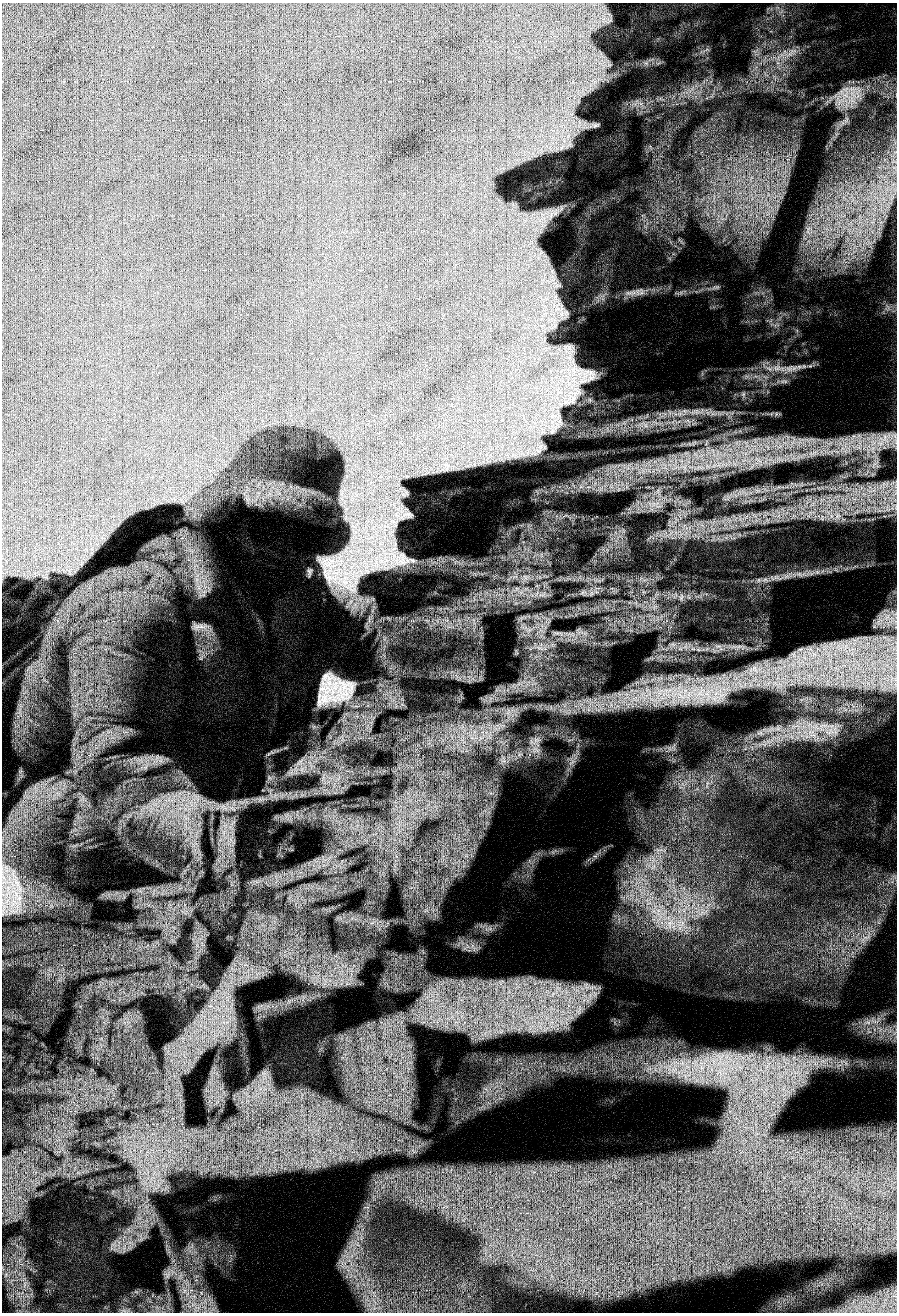
Plate 19 : In the rocky slabs of the "Eperon des Genevois". In the background, the Gyachung Kang (25,910 ft.).

Plate 20 : On the shoulder of the "Eperon des Genevois" (about 26,250 ft.) with the plateau of the South Col (25,850 ft.) ; behind, the south-east ridge of Everest rising to the summit snows.









cold nor by the wind, and even less by the light snow falling down the couloir and enveloping us in its swirl of icy dust, filtering into everything.

The big rocky island in the middle of the couloir came nearer only very slowly. We reckoned the number of rope's lengths separating us from it: a mirage... it must have been three or four times further. Still more arduous step-cutting—the slope was also steeper. Eventually, against the rock we dug a platform. Sheltered by the overhang, we sat down for a few moments beyond the reach of the waves of powder-snow which broke ceaselessly in the couloir.

Pumori (23,190 ft.) had been left below, while Nuptse (25,680 ft.) and its fantastic precipices were still considerably above us; however, we were already feeling fatigued and the South Col was further yet. We had to go on. The hard snow had now to be cut. Stupefied and winded by this work, I climbed empty-headed and thought of nothing when it was not the moment for me to move.

The steeper and more exposed slope forced us to seek a safe route. Lambert turned towards the root of the spur; I heard his axe uncovering the ice-coated rocks. At that time I was last and I simply waited to advance when the rope became taut; I watched it between my legs, slowly running up, and I already dreaded the moment when I had to follow. Then it came: I slowly raised my head, which until then had been leaning on my axe—a heavy head indeed—and looked upwards!

We were engaged in the steep rocks; the rate of climbing was no longer regular, for our violent efforts quickly winded us. But on these rocks we were safer than on the snow. The hours passed—climbing, belaying, waiting...

A traverse to the left. Roch relieved Lambert. He dug a trench in the snow in order to advance; the ice beneath the snow impeded him; the passage was a venturesome one. He put down his sack, which was unbalancing him. At last, on a platform, he sank down. We came up to him; I collected his sack in passing, breathing still more heavily. One beside the other, flopping down, we thought of nothing, except that the South Col was still above us. We reckoned our height as 7400 m. (24,280 ft.).

When we had revived, we pushed this reconnaissance to the couloir descending directly from the South Col to the Khumbu Glacier. The steep rocks and the deep snow ended by exhausting us. The couloir was not safe; it was iced and we feared the stones which might fall from Everest. We therefore abandoned this itinerary and without more ado returned in our steps at two in the afternoon.

The return was made by the same route in three hours.

Plate 21: Departure from the South Col for the south-east ridge of Everest. Makalu (27,790 ft.) rises above a sea of cloud stretching over Tibet.

Plate 22: In the south-east ridge of Everest. The favourable lie of the strata may be noted, for the Tibetan slab overlaps the Khumbu nappes.

At Camp V, in the evening, after some ten hours in the wind between 23,000 and 24,000 ft., we were completely worn out. Never, in the Alps, had we reached such a degree of exhaustion. Dried up by the altitude and the dryness of the air, which irritated our respiratory passages, and with unsteady legs, we thought only of drinking. What weariness! Wrecks that showed no reaction, we vanished into our tents... Short of breath, suffering the effects of altitude, fever and cold... We then tried to sleep. With burning throats we turned and turned. At last, with the help of narcotics, we fell into a light slumber.

Golden light filtered into the tent; the cloth trembled in the gusts of wind; crystals of condensed moisture fell on my face. The sun was up. Tensing undid the zip fastener and greeted us with an energetic "salaam sahibs". The cups of tea and the corn-flakes he brought us were welcome. Lips that had been stuck together by fever were opened with difficulty; the sweet liquid ran down our painful throats and we half-alive creatures resumed a taste for living. We came out of our lethargy slowly.

We had radioed for two sahibs to come up from Camp IV to continue the reconnaissances in the direction of the South Col. We waited for Aubert, Chevalley and the Sherpa, Da Namgyal. Towards noon they had arrived and finally taken up quarters at Camp V.

The following day we reckoned to leave still earlier—it would also be colder—and try to reach the South Col.

On the 17th May, at six in the morning, there were 36 degrees of frost (F.). Wind and hail whipped the tents. The frost infiltrated everywhere. Courage was needed to get out of the quilted sacks. Roch, who shared a tent with me, could not start, because of fever and fatigue.

The sky was steely and Everest had assumed its great white plume[1]. We arranged the ropes (Aubert-Chevalley-Dittert; Tensing-Lambert) and filed off towards the couloir. The track we had made two days earlier, worn by the wind, showed up in relief; it was hard and wound before us, a long frozen ribbon into which our crampons bit perfectly.

From the couloir we were going to try and ascend directly towards the South Col; after several rope's lengths we found ice and gave up in order to ascend straight up to the rocky islet. From that place we tried again to traverse leftwards towards the couloir of the South Col. Aubert began a long traverse and I followed him. He fixed a piton in the ice; the slope was steep, about 50 degrees. Clouds of snow surrounded him; he vanished almost before my eyes. The conditions not improving, I asked him to give up. Having returned to the islet, chilled, frozen, with numbed fingers and short of breath, we had but one longing:

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[1] A cloud of powder-snow raised by the north-west wind and thrown out in the form of a plume into the opposite precipices.

to go down. But it was absolutely necessary to find the way to the South Col! So we resumed the route of two days before. Of the track there remained nothing—or almost nothing. The rocks were not very difficult, but every effort was so painful.

From the platform reached during the preceding exploration, our intention was to work round the "Eperon des Genevois" by the right side and to reach the col by ascending the ledges of snow and rock. We passed beyond the "yellow band" which runs right through this side of Everest. We were then in the imbricated gneiss; the climb was easy, but the rock was less firm. We bore to the right to the ridge of the spur and followed it. The altitude prevented us from accelerating our progress and the Himalayan Law imposed the least rapid pace. Moreover, we submitted to it willingly, seeing that any effort to reach the col that day was fruitless. Our sole aim was to climb as high as possible and see if we could find a way out to the South Col on the right; also to see if this route was practicable for laden Sherpas.

At three in the afternoon we reached the farthest point at 7600 m. (24,935 ft.); Tensing assured himself that Sherpas could pass that way; it would only be necessary to prepare certain passages in the lower part of the spur. Higher up, there seemed no obstacle before the col.

The route to the South Col had been discovered; to say it was easy would be false. The height of the spur, about 3300 ft.—with no possibility of pitching an intermediary camp—was both a serious handicap and a danger that it would be well not to underestimate at such altitudes.

Before descending, I tried again to cross the spur towards the left (the South Col couloir) so as to see if it would not be equally possible to find a way out on that side. It was fruitless; for almost half an hour I manoeuvred on ice-coated slabs. At the end of the rope, I could eventually look into the couloir and its icy ledges. A possibility was certainly there, but that route was too complicated, and too difficult for laden porters.

Then came the descent, monotonous and fatiguing, almost as toilsome as the ascent and requiring even more care. At six in the evening, staggering, stumbling, haggard of eye, and empty-headed, we reached the camp.

Oh! these returns to Camp V, after the endless couloir: I have lived through them and I have also seen my comrades on the job. They were indescribable! No one would believe, without seeing it, that an individual is capable of putting up so great an effort and ending in such total exhaustion.

Following these two endeavours, Chevalley, Asper and the Sherpa, Da Namgyal tried to reach the Col and prove that this route was possible before we all got going in it. On the 17th May, at five in the evening, they reached 7800 m. (25,592 ft.); but to reach the South Col they would have had to cross the crest of the "Eperon des Genevois" at 8020 m. (26,314 ft.). It was too late; worn out by the effort, they had to get down before nightfall. Abandoning the spur, they crossed the west face of Lhotse and hurried down the great couloir of more than 3000 ft.; and once more, completely exhausted, these comrades—who had given the best of themselves to try to reach the objective which we had set for ourselves—returned to Camp V. The effort put up by J. J. Asper, the youngest of us all, had been too exhausting for his years; he went down to Camp IV to recuperate and prepare for the attack.

The same day, Aubert and Flory tried to ascend through the séracs of the west face of Lhotse (Lhotse Glacier); thus all the access routes would have been carefully examined. But at this level at this time of year the powder-snow was not adhering; the slopes were denuded by the wind and there was nothing but hard ice. Our comrades quickly accepted the uselessness of their efforts and returned to Camp V.

After these various reconnaissances, there was nothing left for us but the possibility of the route by the spur we called the "Eperon des Genevois", and we had to try to reach the South Col in one day, for there was no longer the time to establish and equip an intermediary camp. Nevertheless, in order to facilitate as much as possible this stretch which was over 3600 ft. in depth (Camp V, 22,640 ft.; crest of the "Eperon des Genevois", 26,314 ft.; descent to the South Col, 25,850 ft.) we decided to create a depot at 24,280 ft. and to instal 500 ft. of fixed ropes which would increase safety and facilitate progress in the first and most difficult part of the spur. On the 20th May, Lambert, Roch and Flory, with the Sherpas Tensing, Pasang Phutar and Dawa Thondup, climbed up to equip the spur and construct a small platform which would take the loads of foodstuffs and material destined for the South Col. A violent wind blew that day—as on almost all days, moreover—and our comrades had much difficulty in carrying out this thankless but useful task. As a result of their efforts, when they descended everything was ready and we were able to launch a party at the South Col with a view to a first attack on the peak of Everest. In fact, there was no question of waiting longer; time pressed, for the monsoon was approaching and we had settled the latest date for leaving the sanctuary of the upper Khumbu Glacier. But a storm rose and persisted for two days. A violent wind shook the tents, the snow drifted and penetrated everywhere. No one moved.

On the 24th, a first attempt was made. It was to Lambert, Aubert and Flory that the chance fell of being in the first attack. They were accompanied by seven Sherpas, only three of whom would remain with them at the Col. I will spare readers the numerous considerations which made me choose these three comrades for the first attack. I would gladly have climbed with them, but questions of sentiment and so forth do not enter into consideration in such cases. Only the interests of the expedition must count and it was therefore necessary to balance the strength of the two parties which would be launched against the summit one after the other.

Unhappily, following a morning blizzard, our comrades returned at nine o'clock. A resumption of the storm of the preceding days was feared. What a pity! A splendid day was lost and days like that were precious. Perhaps, I told myself, we should have acted more quickly, with less care; but the safety we sought had demanded this work and its preparation, and never—never—would we neglect a single point, since for us the least accident would have robbed us of all pleasure, even in the event of victory.

On the 25th May the sky was perfectly clear and on Everest no plume was showing. It was a day to make one reckon on others equally fine. Lambert, Aubert and Flory were in luck's way and when I shook their hands, much moved, I said to them: "Take care, but go for it." They went off, sure of themselves and confident. The best available Sherpas went with them, for they had to pitch Camp VI at the South Col at 25,850 ft. and push on as high as possible along the south-east ridge of Everest.

When they arrived at the depot the Sherpas, who until then had been lightly laden, picked up the provisions and necessary tents for the South Col. This task occupied an hour of our comrades' time and it was only at 12.30 that they resumed their march, for they were now heavily laden.

The advance was slow and monotonous, for each step required an effort; the yellow band, the great ledge and the crest of the "Eperon des Genevois" were crossed. But a glance upwards seemed to confirm the impossibility of reaching on that day the snow-crest running from the spur to the jagged ridge of Lhotse.

At four in the afternoon the advance went on; two Sherpas, Ang Norbu and Mingma Dorje, went down again, with resulting extra loads for the sahibs and Sherpas, who forged ahead under the dynamic stimulus of Tensing.

Bending under their loads, Aubert, Lambert and Flory continually looked up and finally assured themselves, with apprehension, that they would never reach the col before darkness. Further, the wind rose and hurled gusts of icy powder-snow into their faces. The situation was disquieting. At seven, at the last moment, two platforms were quickly carved out of the wind-blown snow. The tents were unpacked, pitched after a fashion, and these men—who scarcely looked like men any more, so tired they were—hurried into their shelter. Thus, suspended above the Western Cwm, they passed a glacial night, packed one against the other in the tents. They did not come out until long after daybreak, when at last the sun, rising above the crenelated ridges, flooded the Khumbu sanctuary with its light and warmth, which were immediately intense.

Strength and vigour were not lacking in our friends, who struck camp, rolled up the tents, got their hands frozen from contact with the nylon, and at last resumed their march towards the South Col.

On the 26th May, at noon, our little tents, the symbols of our will, were finally set up on the South Col at 25,850 ft., between Everest (29,002 ft.) and Lhotse (27,890 ft.). To the north there was a drop of over 16,000 ft. to the Kharta and Karma valleys; further off lay the Transhimalaya and the Tibetan plateau; southwards and westwards lay an ocean of mountains: the Himalaya of Nepal.

On the 29th May, after establishing a camp at 27,560 ft. and pushing on to about 28,220 ft., to within about 800 ft. of the summit, that is to say to a height never reached before, our comrades descended towards Camp V. On the same day Asper, Chevalley, Hofstetter, Roch and myself left that camp to climb to the South Col for the second attempt. We had much difficulty in forming a team of porters, the majority being sick, fatigued, even frightened. At about 25,000 ft. we passed our comrades of the descending party. Views were rapidly exchanged; they were of the opinion that with luck we should reach the summit. Optimistically, we resumed the climb to the col. Only at six in the evening did we get there; the wind was appalling, icy. In less than an hour it would be dark. An additional tent was arduously erected and the others made habitable.

Our Sherpas were worn out; laden, they had just climbed, for the first time in a single day, the 3600 ft. of height separating Camp V from the South Col. They had put up a colossal effort, the greatest perhaps that has ever been accomplished in the Himalaya.

We spent three days and three nights on the col. The wind never relaxed; rather the contrary. The tents had suffered, their ropes had been torn out and their uprights twisted. At last, on the 1st June, beaten by the elements, we gave up in our turn and descended to Camp V, after an open bivouac at 24,280 ft. to keep Sarki company, who was sick and exhausted by the altitude.

On the 2nd June, at ten o'clock, we were all back at Camp V. After having passed twenty days there, we were about to leave it without regret, considering that we had had much luck and that truly much was needed to attempt the conquest of Everest by the South Col and to return without loss.

And to-day, let us pay tribute to our courageous and devoted Sherpas, our friends who had climbed up there and who had by their efforts made it possible for the first time to reach the highest pass of all. Tensing sirdar, Ajeeba, Ang Norbu, Da Namgyal, Dawa Thondup, Mingma Dorje, Pasang Phutar, Phu Tharkay, Sarki: we shall never forget you.

IMPRESSIONS ABOVE 23,000 FEET

By René Aubert

We had been at our base camp, at 5050 m. (16,568 ft.), for two days and then came the day when we made our first reconnaissance among the séracs. Dittert, Chevalley, Lambert and I formed the advance party.

A crowd of confused questions jostled through my mind and, faced with the immensity of the mountains, I had difficulty in analysing them. But the main one was to know how I was going to react to the altitude, and the further we rose the keener this question became.

In the afternoon of the 1st May, together with Flory, we passed the 6000-m. level (19,686 ft.). We laboured, but we had no indisposition. Each day we wanted to go higher still; and when Dittert did not include us in the next day's party, it came as a punishment. We were all filled with enthusiasm and spurred on by the thought of the unknown.

On the 11th May, we slept for the first time at 6900 m. (22,638 ft.). On the 17th May we reached 7500 m. (24,607 ft.). The ascent of the couloir was very toilsome. Then we bivouacked at 7600 m. (24,936 ft.). The effects of altitude were not yet very apparent, but the cold frightened me. I rubbed my feet for a long time before I put them into my sleeping-bag. Packed closely, one against the other, we waited for the long hours to pass. The dawn came at last, staining the unreachable peaks with purple, and when the sun eventually reached us, we set off.

The Sherpas hesitated; they did not want to go higher. Tensing held a parley. Would he persuade them? We formed a rope of four and resumed our ascent. The slope was not very steep, but we took every precaution, for we were heavily laden for such a height. Raymond led; he went up for a rope's length—about 10 m. (33 ft.)—and then called on us to follow. Leaning on our axes, we watched the coils slowly unwinding, until there were only two, then only one, and finally we had to move. My legs were heavy, but the words of René Dittert, which were valuable encouragement, remained engraved on my mind: "In the Himalaya, one must have guts, one must have will." Ten times, twenty times, we restarted; then the crest was near. The summit of the "Eperon des Genevois" was reached. Our fatigue dispersed, and we went slowly down to the South Col.

I think it was when we set up Camp VI that we most felt the effects of the altitude. Our movements were slow; to stoop constituted a real effort, and to carry a stone was exhausting; we had to sit down to fix the tent ropes. When this great labour was ended, stretched in our sleeping-bags, we fell into a state of semi-lethargy. It would have been easy and pleasant to die. Like sick men, stricken with a high fever, we listened, as if through a fog, to our comrades speaking, but when they asked a question we had to make a great effort to reply.

Nourishment, too, presented a problem. You want what you cannot get. If you think you would like some condensed milk, at the first spoonful you succumb to nausea. Tepid corn-flakes are like blotting-paper which you force yourself to swallow. The air is so dry that your throat burns.

Thus the night passed in a half-sleep, after which, with heads wearied by the continual slap of tents whipped by the wind, we had to set out. Crouching with my feet in a hollow, I exhausted myself lacing up my boots and crampons. On touching them, my hands turned to ice, so now and then I put them in my pockets. Then came a cup of coffee—alas! it was lukewarm. Fixing my goggles firmly, I went out. The wind whipped at my face and violently flung at it quantities of snow crystals. The business of roping up was truly no pleasure, but slowly the march was resumed. Even this slowness was still too fast; after a few steps we had to stop to regain our wind and, leaning on our axes, to restrain the beating of our hearts.

There was only one *leitmotiv* in my head. It was Dittert's phrase: "In the Himalaya, one must have guts, one must have will." I repeated it to myself because on this second day at the South Col might depend the success of the expedition.

Of the eight hours spent between 8000 and 8400 m. (26,250 and 27,560 ft.)—during which we dragged our parched and emaciated crops around—there remains for me only one memory: the moment when, from Camp VII, I saw the Tibetan plain and the Kharta valley stretched before my eyes. At that moment, weariness and privation dwindled in my spirit, and the memory of these moments, so ardently desired, will remain for me an unforgettable recompense and satisfaction.

THE ATTACK UPON THE SUMMIT

By Raymond Lambert

After receiving the instructions of the leader of the climbing party, René Dittert, who entrusted me with the control of the first assault party, our task was to climb the slopes leading to the South Col and there establish a camp. On the day after that, we were to look for the route along the south-east ridge of Everest, pitch there a final camp as high as possible and then attempt an assault in the direction of the summit. As soon as the preparations were completed, we set out on the 25th May at about eight in the morning, the ropes being organised as follows: Aubert, Flory and myself, followed by the Sherpas Tensing, Pasang Phutar, Phu Tarkey, Da Namgyal, Ajiba, Mingma Dorje and Ang Norbu.

As on preceding days, we left Camp V in the direction of the great couloir. Very gradually this couloir had been transformed into ice, but as we had faithfully followed the same tracks each day, the snow had consequently adhered to the places where we had passed and thus had formed to some extent a small raised slope of snow, which the wind was unable to blow away. After an hour's march the porter Ajiba asked to go down; he had a fever and this obliged us to share his load among the other Sherpas.

The ascent continued slowly and arduously, for we were all fairly well loaded. We arrived at the first rocks, situated in the middle of the ice-slope, where the wind was whirling round and flinging the powder-snow into our faces; but we were all possessed of the will to conquer these elements, which were striving to delay our advance. After working round this rock island on the left, we ascended a further 150 ft. up a steep slope of snow and then found the fixed rope placed there during the preceding days. These fixed ropes greatly facilitated the ascent and provided especially a very great safeguard for our valliant porters, who were following us without the least argument or complaint. But we had to be careful not to increase the pace, for the march was becoming irregular and, from time to time, too quick, because of the help given by the fixed ropes. When these 500 ft. of fixed ropes were passed, we reached the place known as the Depot, at about 24,600 ft. We stopped there for an hour in order to load up with foodstuffs, meta, tents and oxygen cylinders. The Sherpas, too, increased their loads, for we were endeavouring to take the maximum of material with us. Then we resumed the ascent, climbing a few easy, snow-covered rocks. The wind blew violently and continued to tear the snow from the ridges of Everest and Lhotse above us. But because of the extra weight we were carrying, our pace had slowed considerably. Nevertheless, we made height.

We were now on the "Eperon des Genevois", and at the end of two hours we left the rocky part in order to engage upon the upper slope which defends the approach to the summit of the spur, the height of which is 26,314 ft.; but behind us the sun was rapidly declining and it was half-past two. We traversed to the right and ascended the centre of the final combe. To calculate distances is extremely difficult in the Himalaya. We went straight up, between snow and rocks, ascending as quickly as possible, for we were already afraid of having to bivouac in the middle of the slope without reaching the col. The hands of our watches turned very rapidly. At four o'clock two of our Sherpas declared that they had cold feet and wanted to go down; these were Ang Norbu and Mingma Dorje. This made the situation very serious; clinging to the middle of the slope we had to unload them, open their loads, take out the indispensable material and divide it between us. Flory took a tent; I took one too. In passing the sleeping-bag to Aubert, it slipped out of my hands and fell down the 3000 ft. slope of the South Col.

The situation became increasingly critical; we fastened the two remaining loads to the ice-coated rocks with the help of pitons and the two men quickly descended without further explanation. The remainder of the caravan went on; the agony grew; we would never reach the South Col that day. What should we do? The depth of the snow was not enough to allow us to cut platforms for pitching the tents. After crossing a further small rock ridge, the slope eased off and the snow was luckily more abundant. The sun was sinking rapidly behind Pumori and clouds were slowly invading the Western Cwm. I thought of my comrades at Camp V, who were following us with a telescope. Their anxiety would certainly be great at seeing our situation. But we had to do something and dispositions were taken at once. Flory and I dug a platform with our ice-axes; Tensing and the other Sherpas dug too. Night had now fallen, but we succeeded in pitching one tent on a miserable sloping platform above a fearful abyss. Aubert held the loads on the slope.

The cold was intense, the wind began to blow worse than ever and the darkness was complete. Roped together, with our crampons on our feet, we installed ourselves somehow in the tent; the Sherpas, too, were in shelter. In this sad situation, squeezed one against the other—Aubert at the far end, Flory in the middle and myself at the other end—we clung on as best we could throughout the night to keep the tent in place, since the wind threatened every moment to carry it away. We had eaten nothing and drunk nothing for many hours, but our brave Tensing, whose strength and will we found astonishing, had thought of us. Roped to the Sherpas' tent, in the darkness he crossed the 20 yards separating the two tents in order to bring us tea, biscuits and cheese. Twice he came in this way to bring us things to eat. The night was icy and we did not have a moment's sleep; we were afraid of falling asleep and not feeling the effect of the cold on our feet, since there was a danger of their freezing. But everything comes to an end; the dawn of the 26th May broke and then, after a wait of some hours, the sun at last rose above the crenelated ridges of Lhotse and came to warm and encourage us. Tensing brought chocolate and told us that the Sherpas had passed a very bad night; there were four of them in their tent and I enquired how they had been able to cook. He explained that two of the Sherpas, Phu Tarkey and Danamgyal, were going down to get the two loads abandoned the evening before and would join us at the South Col. Pasang Phutar would remain in the tent to wait for them, for he was suffering from the altitude.

We decided to go on, the four of us: Aubert, Flory, Tensing and myself. It was absolutely necessary to get to the South Col. We loaded up again to the maximum and we rose slowly, coming out upon the summit of the "Eperon des Genevois", at 26,314 ft., at ten in the morning. The point is nearly 600 ft. above the South Col, which was reached for the first time. We enjoyed a splendid view on the Tibetan side, and before us Everest rose majestically into a perfectly clear sky. Several photographs were taken; Tensing decided to go down and meet the other Sherpas and he took off his load, which we took with us to the col. He quickly vanished down the slope, while the three of us continued to the South Col to pitch our camp. Nuptse was below us, Lhotse was only a short distance away and there was, perhaps, a route up it, but we would have had to go closer to form a precise opinion. Anyhow, at this altitude that summit remains a great problem.

At the col we began to put up the tents; the wind blew violently and the three of us were none too many to hold them in place; we had to weight the interior with stones, for it was impossible to fix them any other way. It took us two hours to erect three tents. The col was bare of snow; it was formed of ice, covered with small rocks, making a sort of moraine. After establishing this camp, there was nothing to do but await the arrival of the Sherpas; Tensing, for his part, had ascended to the summit of the Eperon, descended once more to the site of the bivouac to bring up some loads and to help the three other Sherpas, who were very fatigued and sorely tried by the altitude. On this day he put up a very considerable effort. Only one tent had been left behind, which the second assault party was to recover when ascending on the 29th May.

I took a short walk on the col. I went to inspect the top of the left-hand couloir of the South Col and I took a few photographs, but, while returning to the tents, I felt the effects of the altitude and had much difficulty in walking, for

I stubbed my feet against the rocks and halted frequently. However, the view was awe-inspiring and unique—if only we had been fresher and more lucid, so that we could have enjoyed it thoroughly! The Sherpas, when they arrived, were sick and fatigued. Laboriously they melted snow and prepared a warm drink; we nibbled biscuits and chocolate, sucked condensed milk and lay down. Aubert and Flory were in one tent; I slept with Tensing, and the other Sherpas were in the third tent.

The next day, the 27th May, the three Sherpas—Passang Phutar (aged 21), Da Namgyal and Phu Tarkey—had to go down. They were unwell because of the altitude; we asked them to accompany us higher, but they could not do so. We let them go. They passed back over the summit of the Eperon and descended to Camp V. With them I sent René Dittert a very badly written and, I think, an almost illegible message; but after all, they would explain the situation. For our part, we realised that we would not be able to carry all the necessary material for a camp on the ridge. Nevertheless, Tensing loaded himself with a tent; we took in our sack a few small foodstuffs and the oxygen apparatus, and decided to seek the highest possible itinerary, pitch the tent and descend again to the South Col. This job would be of service to the second assault party.

We slowly ascended the slopes in the direction of the base of the south-east ridge of Everest on two ropes: Aubert and Flory, Tensing and myself. We reached a small snow-col situated between the base of the ridge and a small summit of 26,972 ft. We gradually drew near to the ridge after numerous halts, and Aubert and Flory went on a little ahead to see if it were possible to use the ridge or the Tibetan side to climb the slope above us. After a moment we followed them, but the ridge was too steep and rocky, while the steep and ice-covered Tibetan side was too dangerous; so we returned in our steps and passed along the base of the first rock buttress on the South Col side. Tensing and I advanced in the lead, relieving one another from time to time in cutting the steps; at other points we sank in up to the knees. Thus we ascended between rocks and snow along the left bank of a couloir. The temperature was pleasant and we were sheltered from the wind.

Reaching about 27,230 ft. we should have left the couloir and taken to the rocks; but we suddenly realised that to climb even these very easy rocks would make us very winded indeed. I stopped a moment with Tensing, and we inhaled a little oxygen while waiting for our two comrades who were following about 150 ft. below. I took advantage of the moment to photograph Tensing, and I also took a picture of René Aubert emerging from the couloir. As we had only one oxygen apparatus between three, we used it by turns. We could see our little tents on the South Col already well below us. The climb was resumed and after another 150 ft. we emerged upon the last slopes of mixed snow and rock, reaching the summit of the first step, where we decided to pitch the camp. It was four in the afternoon, the view over rounded mountains, stretching for hundreds of kilometres, was quite tremendous. The Tibetan side was cloudless, Kangchenjunga loomed up in the west, with Makalu and Lhotse quite close. We were at almost the height of Lhotse, 27,888 ft., and it was fine, almost warm, and windless, and we felt well even though already affected by the altitude.

While climbing up the last 300 ft., I had said to myself: Why not take the risk of sleeping here? But we had only one tent, no stove, no sleeping-bag, no mattress. What was to be done? Thereupon, Tensing proposed to stay with me and try an attack the next day. I agreed at once to risk a night at 27,560 ft., and we spoke about it to René Aubert and Léon Flory, who had just joined us. In view of the impossibility of all four of us remaining, two would have to go down; they agreed to descend to the South Col and wait for us there, performing the function of a party of support and assistance. We took a few photographs and, embracing, we separated. Aubert and Flory went down and took an hour to reach the camp. It was half-past four; Tensing and I set up our tent and hid ourselves inside it. The sun had vanished behind Everest; the cold made itself increasingly felt, and outside the tent the thermometer fell to 54° (F.) of frost. However, it was impossible not to admire the immense panorama unfolded before our eyes on the Tibetan side, though on the Nepalese side, on the contrary, evil clouds were coming in from the west, hiding all the Himalaya of Nepal. I only hoped that the monsoon would still leave us a few days respite before breaking upon the region of Everest.

A dreadful night began. Nothing, as it were, to eat: a little cheese, a sausage, a candle to melt a little snow and that was all. In that little tent, clinging to the ridge of Everest, there commenced a terrible struggle against the cold. We thumped each other throughout the night, rubbing our limbs which were gradually growing numb. To sleep was out of the question and at last, at six in the morning of the 28th May, I opened the tent to see what the weather was doing. On the Tibetan side it was very clear, but over Nuptse and over the Western Cwm of Everest great black clouds were advancing at a height of about 26,000 ft. and I doubted that my comrades at Camp V could leave that day for the South Col. Little by little Lhotse hid itself behind the mists which were closing round it; but it could not be helped—there we were, and we would attempt the assault all the same, and try to turn back before it was too late.

Since we were not undressed, and that we had nothing to eat or drink, the preparations for departure were very brief and only the crampons were difficult to put on again; it was cold and there was a danger of our hands freezing. At six o'clock we set out along the ridge with three cylinders of oxygen. The ascent was relatively easy; below the level of the ridge, we went forward 20 yards at a time, making use of the snow and clinging to the rocks with our hands. To make the track, we relieved one another frequently and we halted to regain wind. The weather grew increasingly bad; we were climbing terribly slowly. We felt our legs grow even heavier and become like lead, while our brains also solidified and lost their faculties. From time to time the fog enveloped us and we were afraid of being caught by the storm. At moments we could see Lhotse, but it was sinking more and more into cloud.

After having moved along a part of the snow-ridge which formed an immense cornice on the right, we reached the terminal part of the ridge culminating in the southern summit of Everest. We traversed a few yards to the left; Lhotse loomed up for a last time between two banks of cloud, but we had climbed above it. We were some 500 ft. from the southern summit, at 8600 m. (over 28,200 ft.), or perhaps a little more. The weather was becoming distinctly bad; the snow was blowing directly into our faces; the oxygen we had been taking from time to time produced only a passing improvement, for it was impossible to march with the apparatus to our mouths. The wind was becoming more and more violent and I realised that we would never escape if the storm broke. Without saying a word, Tensing and I understood that if we wanted to keep just one chance of getting back, we must stop. It was 11.30 a. m. Slowly we returned in our tracks, hoping that our comrades of the second party would have a better chance of success; but it had taken us 5½ hours to ascend the 200 m. (650 ft.) from the last camp.

I hoped that the descent would be less hard, but the deterioration continued hour after hour. To reach the camp we literally dragged ourselves along, and we left the oxygen apparatus and the tent where they were. It was now a question of regaining the camp on the South Col, where Aubert and Flory were awaiting us. Reaching the saddle of the col, after numerous halts, we saw our two comrades coming out to meet us. Thanks to their assistance, we painfully regained our tents. They gave us drinks and took off our crampons, and we told them of our terrible journey. On the next day we should have to call on our last reserves of strength to pass once more over the summit of the Eperon and descend to Camp V.

For the four of us the expedition was finished; that is to say, we were descending without any physical possibility of making a fresh attack. We would give information to our comrades who ought to have reached the South Col that same day, but who, because of the bad weather, had put off their departure till the morrow. My appetite remained good despite the difficulties we had in cooking. On the morning of the 29th May we succeeded in making coffee and in sucking tubes of condensed milk. Tensing had not budged during the night; he did not want to take anything, but I forced him to drink a little liquid, for we were greatly dehydrated.

I called Flory, so that we might take the decision to go down; we collected our few belongings, left everything else where it was for the second party and, in view of the weak state we were all in, we preferred to rope up as a foursome. At 9.30 a. m. the summit of the Eperon was reached and we took a last photograph of the peak, which that day was without a cloud, in an absolutely blue sky. Only a single layer of cloud veiled the Nepalese face. At the start the descent was relatively quick, but fatigue returned, the sun burned, our legs were like lead, and our ankles got mixed up with our crampons. After some snow-covered rocks, we arrived on the Eperon itself, and what was our joy when we saw, first Asper and Roch, then Chevalley, Dittert and Hofstetter emerge at the level of the Depot, followed by the Sherpas! We gave them all our information and exchanged views, but for us the trip was ended and we were moving in the direction of Geneva—as Dittert said to me. And, seeing them continue in the direction of the South Col, we were more inclined to pity than to envy them. From the bottom of my heart I said to myself: "Poor fellows, they're for it, up there!"

Then the descent became abominable; the heat on the last slopes was very painful; our throats were absolutely dry and all of us suffered from sore throats. At four in the afternoon we reached Camp V, weary and almost at the end of our tether. Ang Dawa was there and he gave us something to drink—fruit juice and tea. The next day, Flory and Tensing descended to Camp II and then to the base camp. On the 31st May, Aubert descended with Ang Dawa, and I remained at Camp V with Dawa Thondup and Ajiba to await the return of the second party. On the 2nd June, I left Camp V with Hofstetter in the direction of Camp III and the base camp. On the 3rd June, we reached the base camp and were once again with Dr. Wyss-Dunant, Flory, Aubert and Tensing. For us the adventure was at an end.

MAN AT GREAT HEIGHTS

By Gabriel Chevalley

On the 29th May, a little anxiously but nevertheless full of hope, Dittert, Asper, Hofstetter, Roch and myself left Camp V at seven in the morning, in very severe cold, with Mingma Dorje, Sarki, Dawa Thondup, Ajeeba and Ang Norbu. Except for Hofstetter, who had joined us the day before, and Asper, who had been suffering from altitude sickness despite his remarkable customary aptitude and had been down to Camp IV to recover for a few days, we had been staying at Camp V, at 22,640 ft., for 13 to 15 days. Nevertheless, we still felt ourselves capable of a great effort, though Roch, who was handicapped by a stubborn cough and by insomnia, was no longer in a very brilliant physical condition. As to the Sherpas, they had seen their powers put to a rough test, and only Mingma Dorje and Sarki agreed to climb up to the South Col to stay at Camp VI, the rest insisting on descending the same day after carrying a small load as high as possible.

When the two parties passed on the "Eperon des Genevois", Lambert and Flory, who were quite fit, soberly but quickly explained their attempt and its vicissitudes, and gave us their advice. Aubert and Tensing were very exhausted. We parted greatly moved, and the interminable and harassing ascent went on, punctuated by halts that were frequent though brief. At about 25,250 ft. there was so little strength left in my legs that I was siezed by the desperate fear that I should not be able to go further. But after one of our halts a quite mysterious phenomenon occurred, which I had already experienced once or twice before: without any change in the circumstances, strength returned to me, as if some nervous influence had improved output, or had removed fatigue after the manner of a drug, though we had never taken any during this expedition.

We joined the multicoloured band of Sherpas, who were seated on the slope. Their faithful glances expressed confusion and anxiety. We realised what they wanted to say to us: "You see, we can't do very much more! The afternoon is already far advanced! Do you really want to go on and to ask us to continue?" We hastened to do what we could, for both instinct and reason warned us of the mortal danger of being overtaken there by exhaustion or darkness. The Roch-Asper rope was not far below, but at that altitude it was already a good three-quarters of an hour behind. The Sherpas, attracted now by the close shelter of Camp VI, completed the ascent. At last we crossed the hump at 26,250 ft. and descried the South Col, a wide saddle, partly of wind-swept ice and partly of stones, dominated by the blackish pyramid of Everest.

The sight of the two tents filled us with inexpressible relief. We reached them at about six in the evening. A ferocious wind was blowing and falling down upon Tibet. The camp, which was pitched upon the stones, had a disquieting appearance, its rudimentary equipment being scattered in every direction; it would only provide shelter when we had put up the third tent, which had been left by our companions on the other side of the hump, and which we had collected in passing, very much damaged. Eventually, we were all in these tents in the following three groups: Dittert, Hofstetter and myself; Roch, Asper and Mingma Dorje; the four other Sherpas.

This first night was quite difficult for everyone. Over the rest of my clothes I was unwise enough to pull on an anorak, stuffed with various objects, and to stretch out between my companions with my head to the same end; I was soon almost suffocated by the pressure of their bodies and was forced to extricate myself at all costs and, abandoning my sleeping-bag, take refuge at the far end of the tent, where I remained until morning in a half-crouching position.

The day which followed such an effort, plus an uncomfortable night, could not be given to continuing the ascent. Moreover, although the weather was very fine, the wind blew with a violence that ruled out any attempt or any activity; it tore a plume of snow from the south-eastern ridge, where we perceived—a touching sight—the tent which had been left there by our comrades. But on that day we could only try to rest and to organise ourselves for an attempt postponed till the morrow. The three Sherpas had already departed without our having seen them; Sarki and Mingma Dorje, the latter entrusted with the cooking, were in their tent; Hofstetter went in with Roch and Asper, so as to leave Dittert and me, who might try the next day to move up to Camp VII, more comfortable in our own.

We were horribly thirsty. At last, in the middle of the morning came a cup of chocolate, the first liquid we had taken since the previous morning, when we left Camp V. Up at that height, everything becomes terribly precarious and difficult to carry out; severe dehydration results from the practical difficulty of preparing drinks in sufficient quantity. To equip yourself and to go out represents an enormous physical and psychological labour; and as soon as you stand up outside, overcome by vertigo, you are staggered and paralysed by the icy wind which freezes your hands for quite a long while.

The consequence of this state of affairs was purely and simply to shut us up in our tents, which shook and flapped incessantly. Inside, your capacities are much diminished; you cannot move without getting out of breath; you struggle against the congestion and disorder; you do your best to strengthen the tent ends, which the wind strains to lift up and tear to pieces; you place your boots inside your sleeping-bag; you search for something to eat (nuts, bacon—too difficult to cut—a fragment of sausage, a little jam); you would like more to drink (but Mingma Dorje cannot do much on his Meta stove); you fall asleep and the hours fly quickly by. On waking, the psychological struggle is quite painful. Your thoughts have slowed down; they are vague, perhaps euphoric; judgement still remains good, but reflection is laborious. As for your will, it persists and decision is not lacking, but the too confused situation, or the carrying out of some act which encounters insuperable obstacles, is a restraint upon it.

What should we be able to do the next day? Hofstetter, who was in good form, should be able to back us up; but we feared this would not apply to our other two companions—Roch, weak and coughing, Asper drowsy—and the two Sherpas. The latter would have to carry our equipment up to Camp VII, so as to save us from the fatigue which would completely spoil our chances. We were equally concerned, Dittert and I, about our own capacities, knowing well the immense effort required by an attempt and the extreme prudence which it imposes; however, we much wanted to try, for it would be the expedition's last attempt.

On the 31st May, after a better night, we planned at first to leave at about ten, each of us carrying a light load, and we were all in agreement. But circumstances were in league against us; that morning the wind made only a pretence of easing; the Sherpas did not move. Roch made up his mind to descend; Hofstetter would accompany him. But they did not leave until two in the afternoon, and when they reached the hump an hour later, Hofstetter rightly reckoned that the afternoon was too far advanced to begin the descent with a companion handicapped by serious weakness; he restrained Roch despite his furious insistence, and they returned to Camp VI. At the end of the day we could no longer see the tent on the ridge. Moreover, it was clear now that we were beaten and that we should have to begin the retreat the next day. I went to see Roch; to inhale some oxygen would do him good.

On the 1st June I made a few notes in my diary: "08.00. Have not yet looked out of the tent. I think it's fine. This morning the wind is much less violent. Pulse on waking, motionless: 68, then 80–88. Received a cup of coffee from Mingma Dorje. Then ¾ h. of oxygen; very pleasant, more lively imagination; pulse not restrained; on the contrary, it rises to 88 and is fuller. Yesterday evening an oxygen session; pleasant and induces sleep and appetite; I ate several slices of sausage and had a great hankering for nuts which I did not find. 1 Persedon and 1 Medomine, slept until 00.30, then not ill but disturbed. I should have tried to give oxygen to the Sherpas. It was too arduous in these conditions. And could I control it? I have a hankering for a big helping of warm porridge, but I'm about to swallow some red-currant jam. It is done. Cigarette. Dittert is dying to sleep, and sleeps."

Everyone prepared for departure. Two hours, more or less, were needed for putting on our clothes and boots and for arranging our packs. Then there were still our crampons to fix. When we were ready to depart, we discovered with astonishment the extent of Sarki's prostration. He had done nothing to get himself ready and, half-stupid, half-euphoric, he still lay in his sleeping-bag, which he had not left since his arrival. We had to shout at him and bully him to get him out of it. Without us, he would quietly have let himself die where he lay.

The first party—Hofstetter, Asper, Roch and Mingma Dorje—left at about noon. Because Roch was very winded at the end of a few paces, I relieved him of his pack; the situation was for everyone very serious. Dittert and I shared some of the contents of Roch's pack and abandoned the rest. I quickly went once more to the northern edge of the col and took two photographs: the temperature had risen, for I found water to drink in the hollows of the glacier. A cloud ceiling at our own level obscured any view from that side.

We departed in our turn, leaving the tents and much material behind us; but Sarki collapsed after a few yards and vomitted; his sack fell a long way. We ourselves were quite heavily laden and we let go a sleeping-bag which rolled off down the great slope. We lost time crossing the hump of the "Eperon des Genevois" too low down, on very difficult slopes—the hump that turns the South Col into such a dangerous trap. Our relief was immense when this ridge, more than 300 ft. above the col, was crossed. But then began a descent of over 3500 ft., which demanded great and ceaseless care, more exhausting than anything we had ever experienced. Sarki, who moved forward like a marionette, was sinking at every moment. It was already twilight when we reached the "Depot". With Sarki so weak, Dittert and I decided to bivouac on that small platform, and Asper decided to join us, while the others continued to Camp V. We were remarkably fortunate that this night, which I awaited with confidence, and filled with joy at having escaped from such great danger, was mild. I was able to melt snow in a medicine tin with the help of two candles; three flasks of welcome water for our terribly parched throats were the result. In our sleeping-bags we were able to sleep for some hours. A slight film of snow fell in the morning; then we waited for the sun. At last, at eleven o'clock, we were at Camp V, all unscathed.

Two causes, meteorological and physiological, the wind and physical deterioration, had frustrated our second attempt, though each by itself was enough to have done it. The former requires no comment, except to recall the frequency of the wind on Everest and the extent to which this factor restricts the chances of success. As to the latter, a variable individual aptitude is revealed. But even as deterioration at Camp V was still only small and slow, at least for those who were best adapted, up at Camp VI it was intense for everyone, and perhaps dramatically quick for one individual who had gone beyond his "ceiling". The appetite grows weak; it might still be possible to maintain oneself, but cooking becomes non-existent and provisioning inside the tents is very much impeded if there is a gale.

This deterioration affects the muscular strength as well as the nervous and mental condition. Prolonged confinement in the tents is in this respect the greatest danger. Outside, on the march, the surroundings, the effect of cold and wind, the better preserved sense of the state of one's resources and one's exhaustion, a certain state of alertness and dynamism maintained by movement and action, are so many factors warning the individual of peril and—in all cases where judgement has remained clear and where he has always acted sensibly—protecting him in a considerable measure against imprudence. But there, on the other hand, in that little cosmos of a cubic yard, a whole range of disturbances can develop—apathy, euphorie, somnolence, prostration—leading, if the reflexes do not work sufficiently strongly, to unconscious suicide, to slow and gentle death. In every way, all the factors, all the circumstances multiply and accentuate their effect terribly, which tends to increase the obstacle and to annihilate the slender surplus of capacities reduced by hypoxia.

It had not been possible to use our oxygen apparatus on the march, the principal reason having been, it seemed, its too great resistance to the breathing action. On the other hand, since the tissues are unable to accumulate a reserve of oxygen, the benefit of the inhalations in combatting deterioration during rest is limited in duration, that is to say, very small if those inhalations are only very intermittent. The perfecting of an efficacious system for the conquest of Everest, as a technical and practical whole, is quite a difficult problem, the more so in that its value cannot be checked except on the site. The observations made by Lambert and Tensing of their reactions during their attempt constitute one more document in the still very short dossier of the extreme heights reached in the mountains.

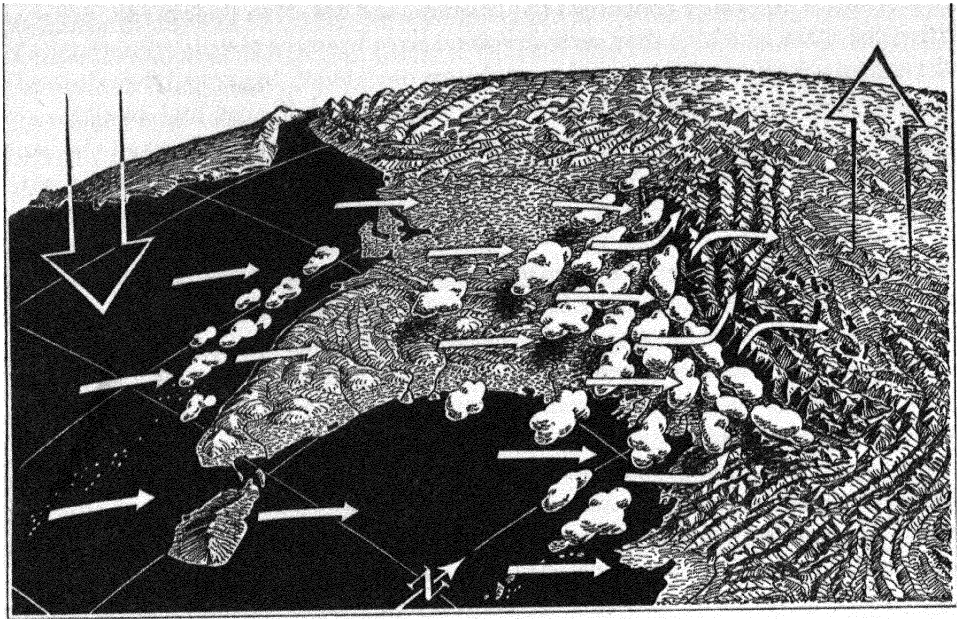
Aptitude can depend on an unforseeable individual factor, as also the phenomenon of "ceiling", which can become apparent in a certain zone of altitude for a given individual. Is it of a nervous order? Is it constant or occasional? Or is it only a semblance, corresponding to a simple fact of exhaustion or of altitude sickness? These are some of the questions. Altitude sickness is characterised by weakness, somnolence or prostration, a rapid pulse, headaches, vertigo and nausea, putting the individual out of action for several days. These observations especially concerned the Sherpas, and are all to their credit, for most often the cases in which they were involved have been the simple consequence of the enormous efforts they agreed to make on our behalf. In general they showed a capacity for effort and a resistance clearly surpassing our own, and an easier and quicker acclimatisation. At very great heights their organism showed the same degree of deficiency as did ours, even more so, but that was due to the greater effort they had had to put up.

We had stayed a long time at Camp V; meanwhile, aptitude there had remained great and the appetite, encouraged by a diet which was still very varied and tasty, was maintained there in a very satisfying fashion; it was nourishment in general which could not be perfect as in the plain, and Camp IV was no better off than Camp V in this respect. The period alloted to our acclimatisation had been necessarily short; should we regret the fact very much? The experiences we went through have given us a very great regard for the resources of our organisms. As a doctor, though I had to use penicillin at Camp V to stop an attack of sinusitis, or given quinine to a Sherpa suffering from a probable malarial crisis, or deplore the small effect of medicines on the severe irritations of the respiratory passages, my preoccupations had not been very heavy and this was due above all to the excellent organisation of the expedition, to its careful management and its well-considered equipment. To close these considerations, I would like once more to stress the immense part played by the mind in maintaining so long and so hard a struggle.

The retreat

On the 3rd June, when the two assaults were ended, the hour of retreat had come. Our strength was used up and our resources were exhausted. Above all, the monsoon was going to break almost any day, and at all costs we wished to avoid being caught by it in the Cwm, cut off from below by heavy snowfalls and menaced by avalanches. We did not know the probable date of its arrival, but it was a serious factor of insecurity and a danger which now demanded an immediate and rapid evacuation. Dittert organised this with haste and firmness; Wyss-Dunant had informed us of the extreme care which would be required in passing through the séracs, because of the profound changes they had undergone, and the crumblings and collapsings which were taking place there with disquieting frequency, now that the warmer temperature was accelerating the melting of the ice. Our comrades of the first party had already started on the path of descent.

We struck Camp V in grey, cold weather. The tents, which had become one with the ice, were hard to take down; the two terraces on which they had been pitched, as soon as they were robbed of their outlines, above a slope scattered



The Summer Monsoon

High above the plains and hills the boundless mills of cloud and wind are driven through the upper air by natural forces, obeying the laws of the cosmos in endless reiteration. The turning earth keeps the air and the sea, its mobile envelope, in constant movement. In its annual course around the sun as the seasons alternate, this floating matter is variously warmed by the sun's constant radiation. Air and water are garnered, as it were, in order to be severally discharged, the air being compacted into clouds through the absorption of water, and borne like a saturated sponge by the wind, so as later to release the water over land or sea.

The seasonal warming of southern Asia heats the open plains like an oven, and the light warm air rises columnwise, leaving an absorptive zone over the earth, into which a replenishment of air has to flow from elsewhere. The warming of the Indian Ocean increasingly saturates the rising column with heavier, vapour-laden air, drawn as by a magnet by the high absorptive power of the inland area of rarefied air. Much of the moist air passes over the land of southern India, and is carried north-east, over the Bay of Bengal, to the absorptive area of the main Asian continent. Meeting in its course the bastions of the great mountains, and driven upwards in order to continue on its way, the saturated air condenses into rain clouds. The rain falls upon the thirsty outlying hills of India, watering the parched valleys that feed the Ganges and the Brahmaputra, while the windborne rain clouds, raised aloft to the mighty peaks of the Himalayas, are so rapidly cooled that the mountain ridges are scoured by snow-storms.

This seasonal cycle subjects the Himalayas to the saturated atmospheric condition of the summer monsoon, often lasting four months. The storms and downpours usually reach the region of Mount Everest at the end of May or early in June, and last with varying intensity until the end of September or early October.

It is according to this timetable, cyclically determined by wind and cloud, that mountaineers have to make their plans for the Himalayas. *O. G.*

with all the tins and various objects thrown there for three weeks, presented a lugubrious and derisory appearance. In a rising gale we succeeded in sorting out all that we could or ought to carry away and in making up the enormous loads.

We left at ten in the morning, without regret at finally quitting the Western Cwm, that narrow prison with so severe a setting, that scene of a struggle which had been maintained too long without slackening, without diversion or relaxation. At the heart of the satisfaction and happiness we brought away from this fantastic adventure, we still felt some fear: that of the bad weather which could bring about a catastrophe. But we felt above all the pleasure at the prospect of seeing again, in a few hours, the first moraines, the first patches of turf, the quiet life—varied and colourful—below the snows, in the immense and deep valley which was about to open before our eyes. It was a wonderful prospect.

In an icy blizzard of snow, our column of nine phantoms found its way through the fog by means of the flags and stakes which marked the route. Even had these not been useful until that day, how we congratulated ourselves that the whole of this route had been staked! There were still three Sherpas at Camp IV, where we sat about for an hour and restored ourselves with tea and warm fruit-juice. We abandoned an old tent and an appreciable quantity of foodstuffs and material; then came a further march through thick fog as far as Camp III. How that track wound about! Everyone was in agreement that, despite our extreme fatigue, we should continue the same day even as far as Camp I. All our loads were made up to the maximum; some provisions were left over and these gave the Sherpas the opportunity for a frantic feast.

They were still going to show us all they were capable of in the descent of the séracs. The rope-bridge had not changed, but the snow-bridges were worn away to a dangerous degree and the crossings were more exposed and risky than ever. Camp II, where there was still a ruined tent, was now an island from which one could only escape by leaping across an enormous crevasse. How the Sherpas, with loads of up to a hundred-weight could perform this leap and land without difficulty on the narrow and icy further lip, a good three feet lower down, was astounding. Further on, the glacier presented a strange aspect, completely eaten away, but with icicles that were still very menacing. As darkness fell, worn out by our loads, exasperated by the interminable succession of corridors, ledges, gullies and flumes and by the jerk of the rope, on legs broken by the fatigue of straddling and leaping, we dragged ourselves along, dead-beat, through the last slopes leading to Camp I.

But disappointment awaited us there. Camp I had been evacuated. Nevertheless, the Sherpas pitched our camp once more; then we crowded together with them—it was snowing no longer—around a fire, a real wood fire! We made tea, we boiled potatoes, and we stayed there until late into the night.

We had changed worlds all at once! Now there was certainty, relaxation, the end of the job, flight! I thought of the pleasure of Dittert, who had had the responsibility of all the operations on these dangerous terrains, and who could now render his account: on the credit side, a great exploration, a great performance by the expedition, fine performances by everyone, good feeling among all from start to finish; and on the debit side—nothing. The Sherpas too were happy, for their own sake and for ours, and everyone was gay.

On the next day, through the tent-flap, the sight of rocks warmly lit by the morning sun and outlined against a radiant sky was infinitely sweet to the eye; the air was deliciously fresh. We could hear the camp waking up with the arrival of coolies from Namche.

At the base camp, which gave us the impression of a village, we were warmly welcomed by Dr. Wyss-Dunant (Roch and Dittert had not seen him for a month), who was relieved now of his anxieties and his long solitude. And there, too, was Pansy the cook and the faithful Sherpanis; Tensing, who came towards us with a joyful countenance, and Phu Tarkey, my own Sherpa, who welcomed me with a winning smile and an open heart. A moment later we were already regaling ourselves with succulent morsels of yak's leg which Flory had roasted over the fire. For all of us, the appetite was henceforth the principal personage of the expedition; our stomachs immediately revealed an enormous capacity for digestion and were insatiable. We had all lost weight, but this was nearly all recovered during the return marches. The other marvel of our natures, which were avid for recuperation, was the depth and perfection of our sleep—a sleep which seized us powerfully, into which we sank in a few seconds, and which left us in the morning with the mysterious impression of having completed an immense rest. I know of no circumstances which produce sleep as magnificant as this; it was certainly a matter of great necessity for regeneration, coupled to a great simplicity of living.

On the 6th June, in splendid weather, with about sixty coolies, both men and women, the expedition took the valley road. We halted on the belvedere of the great moraine to say farewell to the magnificent Khumbu amphitheatre, then in its much more beautiful and engaging spring dress. However, the grass was still brown and would only turn green with the monsoon; but the first flowers were there, the violet-hued dwarf rhododendrons and the primroses. We marched with so pronounced a fatigue that it astonished us; had our muscles been so consumed by the altitude? It was true that we had terribly lean and slender legs, from which the quadriceps stood out, though our calves had been strangely obliterated. Pains in our toes, or a feeling of numbness, proved that the cold—though we had never perceived it and despite the admirable protection afforded by our boots—had nevertheless, after a long time, affected the circulation of these extremities. For some of us there followed a quite marked difficulty during the first stages; later, a few toe-nails came off, though they were spontaneously replaced by the growth of others and everything returned progressively to normal.

A courier, sent out a few days in advance to collect eggs in the region, brought back 22 dozen to the Phalong Karpo camp. Then suddenly, on the 7th June, at 13,000 ft., where the valleys of Pherice and Ding Boche meet, we found the Spring. It was as warm as May at home; the shrubs were in leaf and flower, and a whole vegetation intoxicated us with its colours and scents, more especially as we felt an indefinable weakness and a slight dizziness, and because we had completely forgotten the sound of a river.

At Milingo we camped in the middle of birches, eglantine and tree rhododendrons with vanilla flowers. It was there, at the home of Ang Tchumbi's parents, that was held the first evening of great rejoicing, when we drank *chiang* and the dangerous *rakchi*, and the Sherpas and porters danced throughout the night. On the 8th June, on the hill of Thyangboche, we encountered Shipton and some members of the British Expedition to Cho-Oyu, still bearded when we had already shaved our thin faces. We talked with them for a while, and some hours later, just before we reached the shoulder at Namche Bazar, Zimmermann came running to greet us. We were to stay there for two days, in order to rest and to organise ourselves with a view to starting, on the 11th June (the day after the arrival of the monsoon), a new route to Okhaldunga, the Sun Kosi, the *teraï* and the plains of India.

PROVISIONING AND EQUIPMENT

By Ernest Hofstetter

The four tons of material and European provisions had been distributed in Zurich between 183 cases and containers of waxed cardboard. Shipped to Bombay, they were transported by railway to Patna. A ton of foodstuffs purchased in India, sugar, rice, lentils, flour, and cigarettes for the Sherpas, were added to these four tons and the whole lot was sent to Katmandu by plane in two journeys.

Our Sherpas, who had arrived from Darjeeling two days before us, made haste to prepare the 30 kg. (66 lbs.) loads for our porters. We were pleased to see that the cases and containers had arrived in perfect condition. Petrol was transported in jerricans of 10 to 20 litres. Boxes were filled with money for the wages of the porters. Ski sticks, which facilitated the ascent of the glacier, and ice-axes were tied together and wrapped in jute sacks. The oxygen apparatus and the explosives (provided for freeing avalanches) were carefully packed.

For our own part, we were busy with our personal baggage, which we wrapped up in two cloth sacks, one for everything we would need as far as the base camp and the other for our mountaineering equipment.

At last, on the 29th March, in radiant sunshine, 163 coolies gathered on the Katmandu aerodrome, where their leaders lined them up. This was the start! With anxious eyes they waited for their final instructions from Tensing, our sirdar; he appeared before them with remarkable authority, like a great leader.

A whistle was blown and they were off. Yells, shouts, commotion! The men hurled themselves at the loads, each seeking to pick out the lightest, a sack, a box, the most pleasant to carry, for he had to keep it until he got to Namche Bazar—that is, for about sixteen days.

We were lightly dressed in shorts or linen trousers and a thin shirt. We only carried our mountain rucksacks with our personal affairs for the road.

A few hundred yards from the start there was an incident: one of our coolies made off towards a hillock and dropped his load. He looked as if regretting his engagement and wanting to abandon it. Tensing was watching him, saw what happened and followed. Energetically he called the coolie to order. Quite shamefaced, the latter rejoined the column and followed us faithfully to Namche Bazar, thus sticking to his bargain.

As arranged, we partly supplied ourselves from the villages we passed through on our approach march. The basis of our diet was rice, and when we had the opportunity to buy poultry, pigs, sheep or goats, as well as yaks, we did not fail to do so. However, the meat was for the most part rather tough and the fowls were lean and hard. We called them "racing chicken"! We avoided touching the foodstuffs we had brought from Europe, so as to keep them for the high-level camps. Tea was our drink. Thanks to the discipline of all members, no one was made sick by the water, which we avoided drinking despite a painful thirst.

During the approach march breakfast, taken at about 6.30 a. m., was the most important meal; two plates well filled with rice, and possibly two to four eggs or a piece of meat from the day before, constituted the menu. Chapatis—biscuits made from flour mixed with water and toasted at the fire—and a small piece of chocolate, together with a flask of tea, was the intermediary sustenance. On reaching camp, at about three in the afternoon, we had tea and biscuits; nevertheless, we were obliged to eat as much as we could in the morning so as to hold out until supper at about six in the evening—a new tactic to which I had also to submit so as not to be hungry on the journey.

The coolies set off on empty stomachs; they took two meals a day. After about two hours' march, they had a copious lunch; rice or chapatis, with possibly a piece of meat; they ate enough to frighten us. They took their second meal in the evening around the fire, with, for preference, *tsampa*—grilled barley flour, mixed with a little water, to which butter was added, and seasoned with strong curry sauce.

At Namche Bazar we replaced our light garments by warmer clothing. In the evening, well wrapped up in our long wadded jackets of cotton-lined nylon, and our heads covered with sheepskin caps, we looked in wonder at this new region and its amazing sunsets.

At night we appreciated the comfort of our tents of fine cotton cloth with silk-lined awnings; the nylon ground-sheet and the light pneumatic mattress gave us good protection from the cold. After several days we made use of our second sleeping-bags, slipped on over the first. These sleeping-bags were made of nylon outside and cotton within; they were well filled with down and were therefore comfortable and warm.

When we reached the base camp the high-altitude material was taken out of the boxes. The nylon ropes, cut up into various lengths, proved most satisfactory later on. The boxes containing the precious oxygen apparatus were made ready. Crampons were fitted to the Sherpas' boots and they took possession of their material. For each high-level camp there was a major unit comprising tents, alpine material—bedding was an individual matter—foodstuffs, a stove and saucepans, petrol (up to Camp V, further up it was *meta)*, petards and signal rockets, a "Fox" walkie-talkie, explosives for releasing avalanches, and flags and stakes for marking the route. No camp was occupied until the major unit was there.

Crampons of ultra-light steel, which we wore continuously after Camp I, and our ice-axes were not parted from us for another two months. We also put on cloth gaiters over our boots. They protected us from the wet snow and water that we found in the valley of the gigantic pinnacles, in the polar labyrinth between the base camp and Camp I. Ice-towers from 65 to 100 ft. high, rainbow-hued, formed an immense lacework against a deep blue sky. Our dark glasses gave us complete protection from the intense and blinding light.

Camp I was established, and to complete our diet a live yak was led there across this strange labyrinth.

Once the material had been taken up to Camp I, we still retained ten porters to keep it provided with wood and foodstuffs and so gain time. The reconnaissances of the famous Khumbu séracs in the direction of the Western Cwm were made from this utterly unique place, dominated by a buttress of the western ridge of Everest and the immense and extraordinarily jagged ridge of Nuptse. Two tons of material, foodstuffs and equipment had to be transported through this fantastic glacier valley, where no man had yet penetrated, a valley defended by gigantic séracs.

The transport of the loads had already begun; Camps II and III had been established.

Our light clothes, our trousers and anoraks, gave us good protection against the cold and the snow which fell almost every afternoon. The woollen mitts, and the wadded ones too, prevented icy contact with ropes and axes. At Camp I our boots had been abandoned and replaced by deep boots of untanned reindeer skin, designed according to the ideas of the Lapps, furnished with cork soles, which were faced with leather and rubber. These boots were covered with gaiters which isolated one from the frost in a remarkable way. American Air Force felt boots, with rubber soles, gave equally good service to the Sherpas. We wore them ourselves at the camps, on the marches over easy terrain or on dry snow.

A large but very light cape of silk-lined nylon was worn in extreme cold and was slipped on over all the other clothes.

After leaving the base camp the diet was changed and we all lived on the provisions we had brought from Europe. Nevertheless, the Sherpas always made their *tsampa*, which they swallowed in enormous quantities. Cooking was done over petrol stoves; above Camp V only solid fuel could be used, which made cooking a complicated matter and thus modified our diet. We all especially appreciated the sausages and bacon, the cheese, the tunny and the concentrated soups. Porridge, honey, jam and biscuits were accompanied by tea or chocolate;

fruit-juice and tomato-juice gave us comfort on our return from arduous reconnaissance trips. Chocolates, nuts and sweets always formed part of the contents of our pockets which we emptied during our high-level marches.

Generally speaking, the foodstuffs had been judiciously arranged, so that each day each man got 3500 calories from 1.4 kg. (about 3 lbs.).

As to the principle of buying food on the road during the approach march and the return journey, this turned out to be more complicated than we had foreseen. This was due to the great poverty of certain of the regions we passed through and to the drought which prevailed during our expedition.

Our Sherpas were very fond of our European foods. Ajeeba frequently showed us his biceps and gave us to understand that our little cheeses, when added to the *tsampa,* were indispensible to their maintenance. As to the *gourmand* Ang Norbu, he did much better. On the return journey, when we were forced to leave foodstuffs behind at Camp III, he was dismayed and we saw him swallow in one go the contents of three tins of tunny followed by a tin of half-frozen fruit-juice, thus benefitting for the last time from this much-valued beverage.

Up to 23,000 ft. a huge and solitary chough flew every day around the camps. We often followed him with our eyes, for he was the only living thing in that oppressive immensity. He too seemed fond of our European diet. Or did he envy us our modern comforts?

ACCLIMATISATION

By Dr. Ed. Wyss-Dunant

Acclimatisation is the factor which permits an individual to live in the given conditions of a climate to which he is not habituated, but to which he can accustom himself.

Acclimatisation in the Himalaya has nothing to do with training on the march on with altitudes up to about 15,000 ft., a training which every Himalayist should have acquired in advance. But he is submitted during the approach march to climatic conditions so different from those of Europe that he must first accustom himself to them: the sub-tropical climate of the humid virgin forests and the alpine climate of the numerous passes put his organism to the test of considerable variations of temperature, fluctuating in a few hours between 20° and 100° F. or even above 120° F. on the sunny slopes. This march across the foothills, if carried out over several weeks, presents no particular difficulty of acclimatisation, if one takes into account the sensitivity of the digestive tract which has to become inured—not to say to inoculate itself—against new germs which it is not accustomed to fight in Europe. Therefore nothing but boiled water is drunk, husk-less fruit is not eaten, and one is moderate in one's consumption of native products. Any excess at the start is paid for. The thoughtless consumption of biscuits made of barley-flour *(chapati)*, when one is not yet accustomed to them, shows up in digestive troubles the more disagreeable in that they are weakening to the organism. It is the same with local curdled milk and fermented drinks *(tchang*, millet spirit, *rakshi*, rice spirit).

Excess of tea causes insomnia by exciting a nervous system already irritated by the altitude, and furthermore produces a hyperacidity of the stomach, manifested in the evening by gastric troubles, embarrassing whatever the altitude. It has been especially noticed between 16,500 ft. and 21,500 ft.

This drink, otherwise such a tonic, should be abandoned in the evening in favour of other infusions, such as verbena or lime, which have the great advantage of encouraging sleep.

Acclimatisation to high altitude begins as from the base camp, and is facilitated, moreover, by a great dryness of the air (above 16,500 ft.). 9° below freezing (F.) in a tent is a very bearable temperature. As to the temperature in the open air, varying from 18° to 45° (F.) below freezing, it is compensated by well considered arctic equipment. Although the individual acclimatises himself to the cold, he must also, inversely, acclimatise himself to the heat of glacier basins which are protected from the wind (90° F. under cover), where "glacier lassitude" becomes evident. The headaches which begin between 16,500 and 19,500 ft. are probably due to the differences in barometric pressure; they disappear quite quickly under the influence of acclimatisation. The irregular Cheyne-Stokes respiration at night, varying from 0 to maximum amplitude and falling again to 0, a phenomenon not yet completely explained, likewise disappears with acclimatisation. Finally, it is during the period of acclimatisation that the number of red corpuscles increases—a compensatory phenomenon for the rarefaction of the atmosphere.

The body must also accustom itself to the intense refraction of ultra-violent rays, as well as to the irradiation of cosmic rays, which are much more active than in low country. It must accustom itself above all to the rarefaction of the atmosphere and to the difference in atmospheric pressure.

This acclimatisation of the organs, of arterial tension, of the skin by pigmentation, of the respiration and the heart, is automatic with climbers broken in by years of holiday-making in the High Alps.

It should be said in passing, *a propos* of the rarefaction of the air, that its composition, despite rarefaction, remains proportionally the same up to above 50,000 ft.: 20.95 % of O_2, 78.08 % of N_2, 0.03 % of CO_2. The lack of oxygen is a result of a lessening of the air pressure and thus of the density of the air breathed in.

Sleep gives complete recuperation; alimentation furnishes the indispensible calories. There is not yet, in the zone of acclimatisation, any irrecoverable loss of energy, provided that the time necessary for acclimatisation has been sufficient.

In the Himalaya, the long duration of the approach march resolves the problem from this point of view.

Acclimatisation to high altitudes, once acquired, lasts for many years.

Thus the first expedition is generally that which demands of the individual the greatest moral and physical effort. For not only does he not yet know the successive phenomena which attack his physiology, but he makes first contact with this land of giants where man seems to be an ant with insane pretentions. He learns to defend himself morally and physically.

But on his second expedition this same man finds acclimatisation considerably facilitated by the greater aptitude of his organism, due in part to the diminution of the emotional element which was too pronounced on the first expedition.

The physical battle is less hard; the man and his organism have undeniably gained a greater suppleness in acclimatisation, an acquisition which is not lost and which is maintained over long years.

If acclimatisation is a correcting phenomenon for elements which are trying but compatible with life, adaptation is a hard discipline of the organism which accepts, while seeking to compensate them to the extreme limit of possibility, the elements which are incompatible with life: the rarefaction of the air, the lessening of atmospheric pressure and alkalosis, a phenomenon more pronounced in this region than in the zone of acclimatisation.

One can acclimatise oneself to an altitude of 20,000 ft. but one can no longer acclimatise oneself to 23,000 ft. At the very most one adapts oneself for a limited duration, for only with difficulty is expenditure of energy compensated by recuperation.

Recuperation, in proportion as the fight against the altitude is accentuated, no longer suffices to replace the lost calories. Thenceforward the organism draws on its reserves and the calorie account passes progressively to an accelerated debit, without being able to enter a compensatory credit.

As the individual lives on his reserves, his stay above 23,000 ft. will be limited, whence the necessity of interrupting the stay at high altitude with repeated descents to lower camps, where recuperation, having become normal, will permit a new start for the heights. It is thus by a frequent movement to and fro that adaptation will be effected, a to and fro movement technically realisable when patrols leave to reconnoiter the terrain in succession. The way being marked out and the route opened for the final assault on the heights above 26,000 ft., it will then be advisable to determine exactly the limit of stay at very high altitudes, on pain of seeing appear the phenomena of deterioration which are a solemn warning signal.

Apathy increases little by little and ends in prostration. Sometimes congestion of the tonsils appears, which can produce ulceration, also laryngitis, modifications of cardiac rhythm in the form of tachycardia, hastening an already accelerated respiration, obliging the subject who has abused his capacity for adaptation and exhausted his calorie reserves to descend to the base camp, for one does not recover from sickness at high altitude, but loses one's resistance.

In a work on adaptation to altitude in the Andes, Henderson reckons that simple latent local infections can at 1000 m. and over diminish the capacity for adaptation, even in the absence of clinical symptoms (*Adventures in Respiration*, London, 1938). I learned this to my cost on the 1949 expedition to the Himalaya, when an attack of malaria considerably lessened my capacity for acclimatisation and adaptation. On other expeditions certain climbers have even had to abandon their ascents for the same reasons.

If the to and fro movement between the upper and lower camps can be carried out, so long as they do not exceed 23,000 ft., it is quite otherwise with camps above 26,000 ft. Just as one cannot acclimatise oneself at the former, one cannot adapt oneself at the latter. Only one possibility exists there, since recuperation is non-existent, and that is to live on one's reserves for the three or four days necessary for the attack on the peak.

It is further urgent that this attack should be conducted by a party which, having previously stayed in the zone of recuperation, has been able to fill up with indispensable calories. That is the necessary condition for facing the lethal zone and its mortal dangers—above all in the event of bad weather.

Therefore one does not set out on the supreme attack without previous recuperation.

I have spoken of the "lethal zone": it is fitting to give some explanation of this term.

Survival is the only term suitable for describing the behaviour of a man in that mortal zone which begins at about 25,500 ft. Life there is impossible and it requires the whole of a man's will to maintain himself there for a few days. Life hangs by a thread, to such a point that the organism, exhausted by the ascent, can pass in a few hours from a somnolent state to a white death. This depends first on the age of the subject, and then on his reserves of energy. It is now no longer a question of adaptation, but only of the number of days or hours allotted to the strongest persons.

It was a matter of hours for the young Sherpa of twenty-one, otherwise robust and lively, who, as soon as he reached that altitude after an ascent of over 3000 ft., implored his uncle Tensing to let him die. He went down the next day to Camp IV and recovered his strength very quickly.

It was again a matter of hours for our 25 year-old comrade, who nevertheless succeeded in holding out for three days. Hours, also, for the other comrade of 46 years who had also wanted to reach 8000 m. (*c.* 26,250 ft.). These are examples which should serve as experience for future expeditions.

The ultimate zone

This was reached in 1924 (3rd British Expedition to the north face of Everest) by Norton and Somervell, without oxygen, but they did not pass much beyond 8500 m. (reaching 28,125 ft.). Mallory and Irvine, provided with oxygen, were seen to reach about 8600 m. (*c.* 28,220 ft.), but they did not return.

In 1933, Wyn Harris and Wager (4th Expedition), starting from a camp at 27,400 ft., also reached 28,125 ft. without oxygen.

In 1938, Shipton and Smythe, Tilman and Lloyd (7th Expedition), starting from a camp at 27,200 ft. could not get much beyond this height.

In 1939, F.H. Wiessener reached about 27,495 ft. on K. 2 without oxygen.

In fact, this zone is a limit, and human strength will only be able to cross it on the day when technical perfection will make it possible to ameliorate the physiological conditions artificially.

Lambert and Tensing succeeded in penetrating this zone to something above 28,200 ft. after passing a very difficult night in their tent at about 27,560 ft., where Flory and Aubert had had to leave them in order to get back to the South Col. But as a result of a technical failure which obstructed their oxygen inhaler, as well as the resistence of the closed circuit, they could not use it in continuous respiration. It was found that discontinuous inhalation did not have the desired effect, the resultant well-being having too short a duration. Lambert and Tensing, both having reached a state of euphory, according to their story, saw no hindrance to continuing their ascent to the south summit, had the weather improved. The blizzard, the fog and the overcast sky very fortunately led them to retreat; for they stated on their return that the descent was almost as slow as the ascent and that it exhausted their remaining strength... It was well that they had decided to beat a retreat, for having reached a short way from the tents on the South Col, they had not the strength left to cross a hillock of snow that separated them from it. The assistance of their two comrades was necessary to bring them into the tents. They had passed the final boundary without sufficient means to assist their constitutions in the struggle. Tensing at once fell into that dangerous sleep from which there is a risk of not awakening; the support party revived him with warm drinks.

These two pioneers had suffered cruelly from thirst; they were dehydrated and we are left full of admiration for their will and the adaptability of their constitutions, which succeeded in enduring a barometric pressure of 260 mm/Hg, a blizzard and a temperature of 45° F. below freezing point.

I emphasise the fact that this demonstrates the total exhaustion of the organism which would have been fatal had the two climbers continued their ascent, obedient to that euphory which is nothing but an anaesthesia of the organs of control.

Is there an explanation here of the mystery of the disappearance of Mallory and Irvine?

It seems that this altitude of about 28,200 ft. is a physiological boundary which only a few particularly gifted and well-equipped explorers may overstep—the zone of euphory, of illusion, of maya, which a doctor can sometimes observe in those seriously ill, who have wholly exhausted their capacity to resist. A state of well-being and happiness precedes death, particularly in infectious diseases.

The organism can no longer reveal its fatigue, a physiological result analogous to that obtained with doping medicines so dangerous at high altitude. Thirst shows up in a thick and sticky salivation which demands water. Tinned orange juice is the best drink, acting both as a food and a medicine by its glucose and live vitamin content, and also because the citric acid is very useful in combatting alkalosis.

Alkalosis is a frequent phenomenon during the period of acclimatisation. It is an alkalinisation of the body fluids with a rise in P.H., produced by hyperventilation and, consequently, an accelerated expiration of CO_2. It can appear in the Himalaya in experienced climbers, but generally at altitudes within the zone of adaptation. The Germans (Hartmann) had tried to counteract it with ammonium chloride, without achieving any very conclusive results. I too had tried this medicament in 1949; but it is necessary to introduce a certain quantity to produce the desired chemical change in the blood. Intestinal trouble and profound distaste made me give it up. So I was happy to see the 1952 expedition provided with orange juice, convinced that this drink would be welcome not only against alkalosis but also against avitaminosis. This consideration obliges me to stress the question of vitamins, for our experience in 1952 only confirmed that of 1949.

Vitamin starvation is intense; it shows up in an overwhelming desire for fruits and vegetables, despite the consumption of synthetic vitamins. It becomes apparent, of course, on the return and not on the outward journey, since the organism contains sufficient reserves of them for several weeks. This desire is not accounted for by greed, for even the bitterest substance (e. g. lemon peel) is devoured with zest to the last morsel; I have tucked away raw mushrooms, after identifying them as edible by smell rather than systematically, and raw radish leaves; we have stolen unripe pomegranates which no one wished to offer us. In short, vitamin starvation is manifested acutely, despite the assistance of chemical vitamins. Doubtless, synthetic vitamin C protected us against scorbutic phenomena, but how much more so the minute lemon that a good priest of Shiva had kindly given us on our return!

Conclusions

Throughout the 1952 Spring Everest Expedition, the physiological bearing of the participants was quite remarkable.

During the approach march, the instructions concerning alimentary hygiene were fully respected; only a few unimportant digestive troubles developed. The anti-malarial medicines were distributed once a week, three tables per day, a dose sufficient to give protection against the malaria which prevails in the lower valleys.

Moreover, acclimatisation was achieved by everyone without impediment.

From the base camp onwards the to and fro system of the reconnaissance patrols, and afterwards the transport parties, was carried out with regularity. Each advance party returned to base camp before being too tried, while another set out to the conquest of terrain which they had to win progressively, at first through the Khumbu séracs and afterwards in the Western Cwm.

Camp I, II, III and IV were established in this way, without headaches developing in any pronounced fashion, nor irregular nocturnal respiration, nor insomnia, nor glacier lassitude, except for a few cases which quickly improved. The members of the expedition had been well chosen, all of them first-class climbers. Acclimatisation from the base camp covered the period from the 23rd April till the 16th May with the installation of Camp V at 22,640 ft., that is to say three weeks, a period amply sufficient for accustoming oneself to an altitude exceeding 21,300 ft.

Camp V, situated very conveniently at 22,640 ft., that is to say at the boundary between acclimatisation and adaptation, and outside the zone of deterioration, allowed the advance parties to make a stay of more than a fortnight without harm. The exploration of the slope of the South Col required, in fact, a long and exacting effort. I pay tribute to those comrades who worked there arduously, and especially to their leader René Dittert, who has a masterly way of managing things. From the 10th to 16th May the continual to and fro movement between Camps IV and V, for the transport of material destined for the upper camps, contibuted enormously to facilitating adaptation, as well as securing recuperation before the great attack.

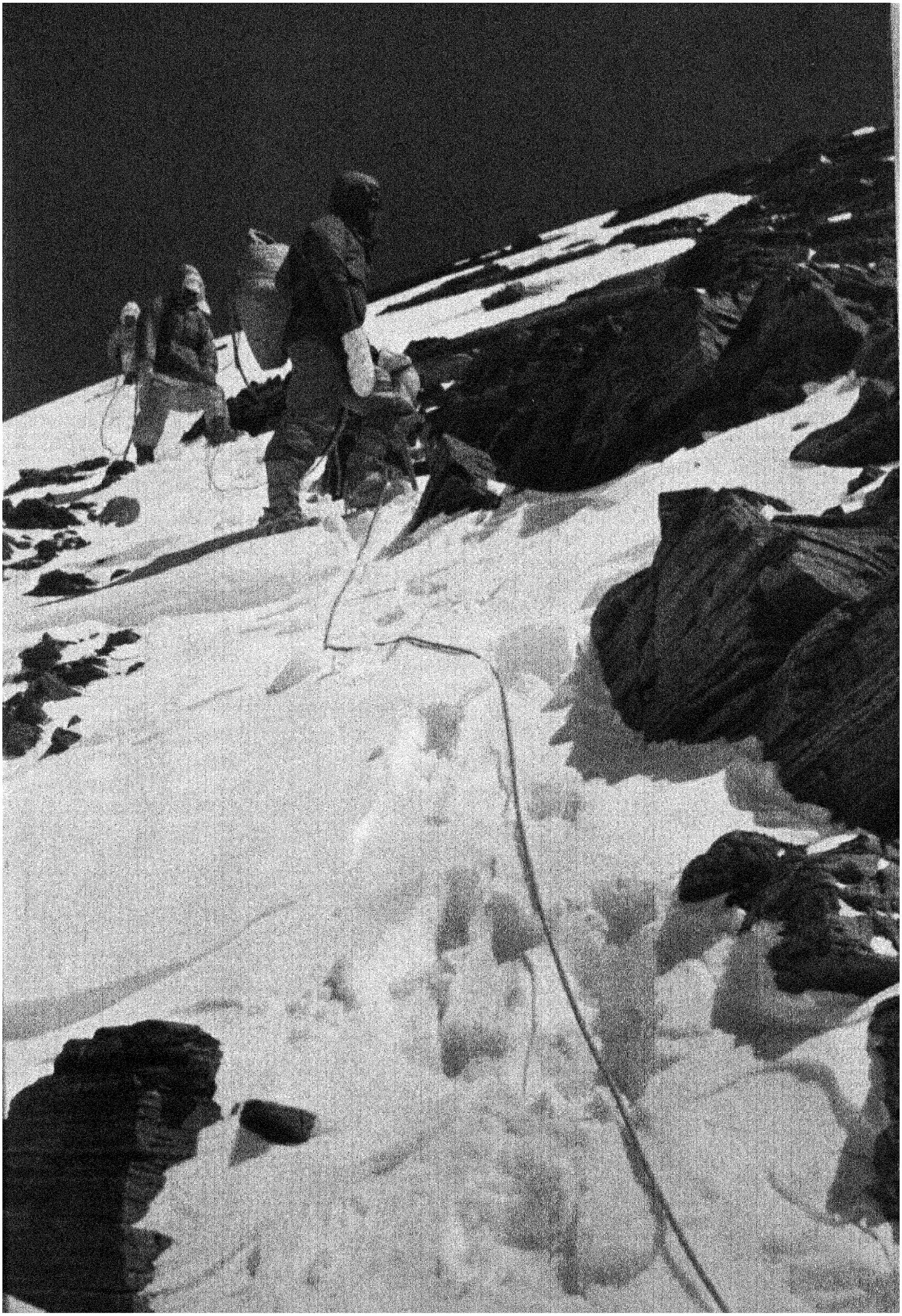
The operations for the conquest of the South Col began on the 15th May and as from the 17th the advance party was complete at Camp V, while the coming and going between Camps IV and V was finished. Thenceforward, until the 28th May, attacking parties followed one another, descending no longer below Camp V (except for Asper who, most fortunately, returned to Camp IV from the 23rd to 27th May). The shuttle service which had thus lasted twelve days was an effort at adaptation a little too prolonged. Had the glaciological and weather conditions been better, these operations would undoubtedly have been conducted in a shorter period, with resulting economy of strength. *For there was nothing to be gained by prolonging so high a sojourn.*

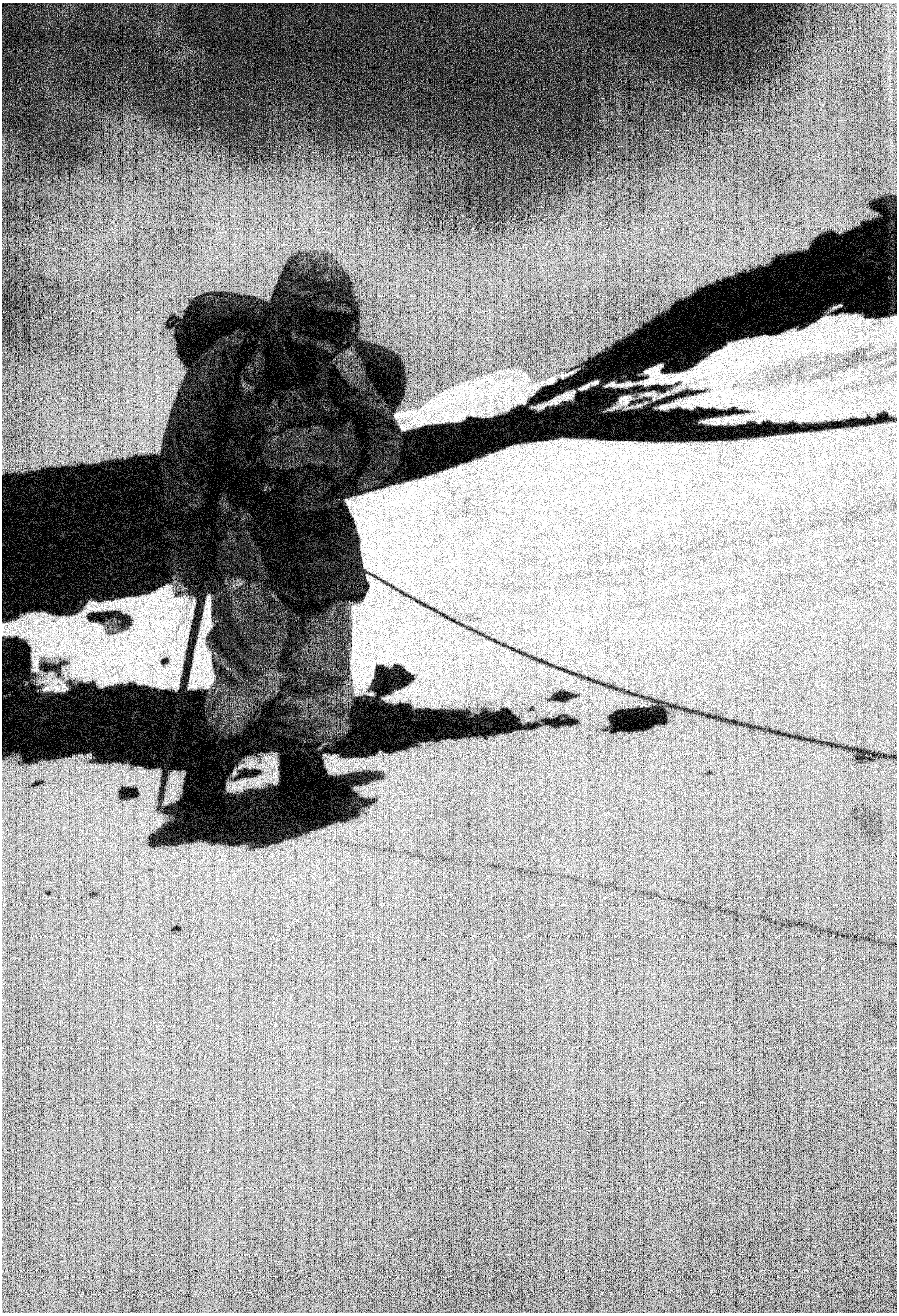
If, finally, it had been possible to pitch an intermediate camp between Camp V and the South Col it would have proved an enormous relief to the advance party and to the Sherpas, thus avoiding their complete defection at the South Col where, exhausted, they could not continue the effort, except for Tensing.

But these were the conditions, and they were unalterable and inexorable.

On the 25th May, the first party pitched a very trying bivouac on the open slope at 25,260 ft. and penetrated the lethal zone of the South Col. On the

Plate 23: On the shoulder of the "Eperon des Genevois": the head of the descending first group passes the ascending second group.





29th May they established themselves at about 27,560 ft.; on the 30th May they reached about 28,220 ft. and returned to the South Col. On the 31st May they reached Camp V exhausted. Their stay in the lethal zone, and afterwards in the ultimate zone, where the barometric pressure was 280 mm/Hg, in a temperature of 36° to 45° of frost F., rendered more acute by the blizzard, had lasted three days. The second attacking party climbed to the South Col on the 31st May, but could not set out to attack the peak because of unfavourable weather conditions. Moreover, they had to use the third day for descending before it was too late.

Perhaps it would have been possible to prolong this stay at the South Col by a day or two, had they been able to establish an intermediate camp. We hoped that this improvement, considerable in view of the final assault, would be effected on the second Swiss Everest Expedition.

And so, without having to deplore any loss of life, without deterioration (except for Dawa Thondup, who suffered from laryngitis, from which, moreover, he recovered), or frost bite (despite two bivouacs on the slope of the South Col, one on the ascent of the first party, the other on the descent of the second), the eight men, who had all climbed beyond 26,250 ft., reached the base camp between the 2nd and 4th June, undoubtedly worn, but all in a condition to resume the long return journey after two days' rest.

Recovery at the base camp was immediate, thanks to an abundant meat diet, vegetables (wild spinach) and eggs.

Truly, the expedition ended happily and one is left amazed, not without reason, at the extraordinary capacity of the human organism for acclimatisation and adaptation without injury, to the very limit of possibility in the fatal zone.

Plate 24: Before traversing the "Eperon des Genevois" and starting the descent, the last man of the expedition leaves the South Col (25,850 ft.).

PRELIMINARY NOTES ON THE GEOLOGY BETWEEN KATMANDU AND EVEREST (EASTERN NEPAL)

By Augustin Lombard

I. INTRODUCTION

It is premature to give the results of my mission so soon. The elaboration of the profiles and the making of a map cannot be done until later, when the rock samples have reached me and it has been possible to examine completely the photographs and the notes made during the expedition. Meanwhile, the reader will find here a few first impressions of the geology of the journey as far as the base camp. The limited scope of this article prevents one from describing neighbouring regions where confirmation is found of several observations mentioned in this work.

I wish to express my thanks to the Governments of the City and Canton of Geneva, to the Genevese committee of the scientific mission, to the Swiss Foundation for Alpine Exploration, to the members of 1952 Everest Expedition, especial its leader, Dr. Ed. Wyss-Dunant, to my companion A. Zimmermann, to the Free University of Brussels, to the Nepalese authorities and to Dr. T. Hagen of Katmandu.

Earlier work

East Nepal has not yet been made the subject of any geological description. Knowledge of the structure and the rocks of Everest go back to the records of the first geologists in the Indian Geological Service who traversed Sikkim and the borders of Tibet. Amongst these precursors, J. D. Hooker (1854)[1], busied himself up to the north of Sikkim in 1849, where he collected fossils in a sedimentary zone passing to the north of Everest. Much later, L. R. Wager (1939) resumed the study. F. R. Mallet (1874) showed that in the Darjeeling district the Damuda series (probably Permian) rest on the Tertiary.

Later, E. J. Garwood (1903) and H. Hayden (1907) left important work behind them on the structure of Sikkim and the borders of Tibet. But it was with the first Everest expedition, which arrived by the northern route, that the geology of the great summit became clear.

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[1] The dates in parenthesis refer to the bibliography.

During the first expedition in 1921, A.M.Heron mapped a region bounded by Everest, the upper Arun valley and the west of Tengkye Dzong. He revealed the existence of a calcareous bed sometimes attaining a thickness of 1000 m. (3280 ft.) and reaching from the northern fringe of the Himalaya to north of Everest. This series was taken up later by L.R.Wager in the course of his studies of the summit formation of Everest. The discovery of some deformed fossils (productids and spiriferids) caused this limestone to be attributed to the Permo-Triassic.

N.E.Odell, having participated in the 1924 expedition, published some geological and morphological observations on the approaches to Everest and the upper Rongshar valley (1924 and 1925), with a geological map.

L.R.Wager, geologist in the 1933 expedition, made some observations on a large sector of the chain, from the Chumbi valley to Everest (1934, 1937). Finally, in 1939 this same author published his discovery of fossiliferous series in a group of hills at Lachi (Sikkim) of which he gave the precise position (higher than the limestones of Everest) and the age (Upper Permian) (1939).

Not far from the Permian stratum referred to by L.R.Wager, J.B.Auden (1935) discovered some Triassic fossils on the occasion of his 1934 reconnaissance. The following year this same geologist described three itineraries in Nepal, none of which coincided with our own (1935).

The Everest massif

Following these various authors, one can represent the highest summit in the world as being formed of a thick layer of sedimentary rocks lying on their metamorphosed and granitised base. This layer rises progressively from north to south with a few undulations and folds of secondary order. At the north peak and in Everest itself it rises sharply.

The succession is reconstituted according to deposits echelonned from north to south, from the youngest formations to the oldest. They are:

Kampa system. Cretaceous and Eocene.
Jurassic system.
Tso Lhamo series, with a Triassic horizon.
Lachi system, about 2000 ft. thick, with an Upper Permian level, towards the summit.
Everest calcareous series. About 2000 ft. thick. Carboniferous, in continuity upon the underlying level.
Everest pelitic series. About 4000 ft. thick. Probably Upper Palaeozoic.

Everest lower calcareous series, conforming probably with the underlying level but unknown on Everest.

This series is considered normal, without discordances or major lacunae as is the case in Garhwal.

The pelitic series is locally granitised.

The summit of Everest is of pelitic rocks from the North Col to high on the north-east ridge. Two yellow bands in the pelitic rocks are easily visible on the Rongbuk face. The two large gendarmes on the ridge between point 8390 and the summit are in the calcareous mass of the Everest series as well as the summit itself. The photographs brought back by R. Lambert and N. Tensing from their attempt on the summit show that Camp VII was in the pelitic rocks.

R. Aubert has sent me a sample from the environs of the South Col, which most probably came from a bed of this pelitic series. The general northward dip of the strata is well known, for this arrangement of imbricated strata has much complicated the ascents by the North Col. There are, furthermore, minor overfolds in this ensemble.

This, then, is the summary of our knowledge of the geology of Everest. No description has been given of its southern face.

The approaches to Everest

Analysing the most recent geological maps published on this region (L. R. Wager, 1939) it will be seen that between the Arun valleys and Katmandu no survey has been made except in the environs of Udaipur. J. B. Auden (op. cit. 1935) has published a profile from Katmandu to the Ganges plain. It is beyond and west of this longitude that Dr. Hagen is carrying out his researches, extending them to the Tibetan frontier. He willingly gave me their essential facts, placing at my disposal the manuscript of a work which has since appeared (1951). I repeat my thanks to him. I benefitted by his critical remarks on my return, when we met at Patna.

Furthermore, one must mention the basic work of A. Heim and A. Gansser on the Garhwal (1939), which will long remain the best introduction to the interpretation of the Central Himalayan structures.

II. THE OBSERVATIONS OF 1952

From Katmandu to Namche Bazar and the base camp

The situation of Katmandu is very fine. The city is in the middle of a not too monotonous alluvial plain; through it the River Bagmati carves a course of which the great gravel beaches and the terraces give one an idea of its violent floods. The background is characterised by an amphitheatre of wooded hills. Some are on the edge of the Terai while others are the foothills of the Himalaya, some of the snowy summits of which rise to the north and north-west.

The Katmandu basin is a large syncline pitching eastwards. The hills are wholly in one of the Katmandu nappes (Hagen, 1951) which can be compared with the Garhwal nappes (Auden, 1937) and those of Almora (Heim, 1939); also with the Darjeeling gneiss to the east. They are No. 4 in the Katmandu profile and lie upon a lower group of nappes known as of Nawakot (Hagen, 1951), the equivalent of the Daling series (Auden, 1935) and the Krol series (Auden, 1937; Heim and Gansser, 1939). Their material is connected with that of the Gondwanian series of the Indian peninsula.

On the 29th March we left Katmandu and crossed the alluvial plain. The monotony of the road was fortunately relieved by the picturesqueness of the people we passed and the straggling villages we traversed: Thimi, Bhadgaon and Banepa. Between the last two localities we crossed a little pass in the bad rock showing sandstones injected with greenstare erect and tilted northwards. This was part of the sedimentary rock and one of the lower Katmandu nappes which are found again at Banepa and in the descent to the valley of Jhiku Khola.

The next day, between Banepa and Daulaghat, we were still in the monotonous crystalline schists, locally granitised, but night overtook me on the road and I was not able to see the contact of the lower Katmandu nappe with that of Nawakot (information from Dr. Hagen). At the confluence of the Indrawati and the Sun Kosi there is a very erect sedimentary band. From this point our itinerary went on quite monotonously in thick series of crystalline schists passing over to an appearance of "lustred schists".

At the Manga Deorali Pass, where we camped from the 2nd to the 3rd April, the view stretched very far eastwards. The Kaileswar Pass opened widely in the axis of a vast synclinal combe belonging to one of the Katmandu nappes. This nappe has its roots toward the north, as is shown also by the dip of the ridges north of the pass.

On the descent to Those one finds these same dip in the roots of the Katmandu gneiss. The village is the centre of an ancient ironfounding industry. The mineral comes from a nearby mountain, as well as the coal of which one sees old workings in the neighbourhood. Coal-bearing beds are known in the Nawakot-Krol nappes. As the position of Those is very much enclosed, I suppose that erosion has very deeply penetrated to Katmandu nappes and that there is even a window into the lower nappes.

From the Chyangma Pass, which we crossed on the 7th April, we travelled in gneiss the dips of which were uniformally northwards; these were roots. South of the pass, on the other hand, the beds levelled out and gave flat, ravined reliefs. These stretched were in paragneiss and crystalline schists, mineralised by iron and copper. It is very probable that a thrust-plane passes between the two.

Up till now we had not yet seen any evidence of former glaciers. It was only on arriving below the Lamjura Pass that a formation showed up which resembled this. My companions will recall the long shoulder that one reaches on the ascent from the camp at Setah, two hours beyond the big prayer-mill of Nimay.

This shoulder is prolonged, and here and there, at about 10,500 ft., it becomes horizontal and splits into two parallel ridges. Between these a few small swampy lakes succeed one another under the most beautiful trees we had seen hitherto. In this undergrowth ferns and rhododendrons thrust upwards. Large beards of lichens hang down from the branches. On the ground primulas and violets flourish. Higher up the rhododendron and magnolia flowers enchant one's gaze. The birds call from every direction and their strange songs echo curiously in this forest.

The Lamjura Pass was not far off and we reached it about midday on the 8th April. Its eastern side belongs to the erosion system of the Solu Khola, very much enclosed and giving an alpine tone to the landscape. Eastwards one glimpses the Solu Khumbu valley which I was to follow on the return. It was possible to distinguish the westward pitch of the tectonic units, of which I thought I might be able to make the details clear on my descent to Okhaldunga.

For the time being the road descended and led us to a small place called Jumbesi, situated in a tributary valley, the Beni Khola. Despite the heavy weather, the view up-stream allowed us to see several great mountainous masses of gneiss which all plunged below other superior units. Snowy summits closed the horizon at the head of the valley and their massive appearance contrasted strongly with the more supple manner of their substratum. This was probably the Numbur massif.

After Jumbesi we passed a shoulder whence the view downstream was grandiose. We plunged into the gorges of the Solu Khola and on to the verdant slopes of Ringmo and Phaphlu. The descent to the river and the climb up again to the Taksindhu Pass was of no special interest and at nine in the evening we camped near the monastery. We passed the evening participating in a burial service and next day continued our march by descending from Jubing, at 9827 ft., to the bank of the Dudh Kosi at 4922 ft. The river flows along the bottom of deep gorges, which open up a little at this spot. Upstream, they have a typically Himalayan profile, with shoulders on both banks, and faces which draw together and end in very narrow and inaccessible gorges. I shall return later to this peculiarity. Downstream, there is the same arrangement across the mass of the Jubing ortho-gneiss.

The track ascended rapidly on the left bank and we camped at Kharikhola on a glacial terrace, the remains of an ancient filling up of a small lateral valley at about 6500 ft.

Henceforward, we drew nearer each day to the High Himalaya and the valley cut through the tectonic elements in transverse profile. As far as Ghat we cross a bold area of roots, those of the Katmandu nappes. Their northward dip oscillates around 40 to 60 degrees. They are much opened up and show, below Puyan, old transverse structures. The material consists of gneiss, certain of which are ortho-gneiss with large felspars.

The Dudh Kosi gorges are very deep and the river is often invisible. Three times we followed a series of shoulders, afterwards returning along lateral valleys. Each time these valleys reveal old glacial fillings, dissected by torrents seeking to reach their line of equilibrium: Puyan, Surkya, Lukla, Chaunrikharkha and Ghat.

At Ghat the gorges opened out. Several terraces ran along the slopes of the Dudh Kosi and it could be seen to cut the fluvio and glacio-lacustrian formations several times. Temporary dams must have taken place, the glacial origin of which was not in doubt, but they could also have corresponded to the structural position of this locality.

Further upstream the gorges closed in again and cut through the massive and folded gneiss. The directions of the folds had changed greatly and the composition of the gneiss too. We were above the zone of roots, at the base of a new complex of nappes which I will call the Khumbu nappes. They were to form the whole of the Namche country and pass further on towards the base camp and up the adjacent valleys. They rose axially northwards, but, a fact quite incomprehensible for the time being, their axial direction was on an average N. 60 W., becoming N. 40 W. and even N. 20 W. in the high country. Great fractures N. 80 W. and dipping strongly southwards still further complicate the deciphering of this tectonic framework. At Monjo the river has left a raised epigenic course which the track follows; the river bed becomes less enclosed and less steep as far as the great rise below Namche Bazar. This rise occurs on the face of a large promontory, the base of which is rocky and the summit capped by a moraine, at the confluence of the Bhote Kosi, which descends from the Nangpa La, and the Dudh Kosi, which drains the Everest massif.

(Plate 25.) Namche is a village of about sixty houses clinging to the slopes of a hemicycle scooped out of the moraine. The origin of this trough is in a large spring which runs out at the point of contact between the moraine and the rock base. By the regular softening of the soil and by regressive erosion an initial depression was carved out. This was certainly enlarged by the intense streaming of the rains which easily attacked the sandy material of the moraine.

Above the village the moraine offers a level area which certainly seems to be a part of a system of terraces in the two converging valleys. It was there that we spent several days in tents before continuing our way to the base camp.

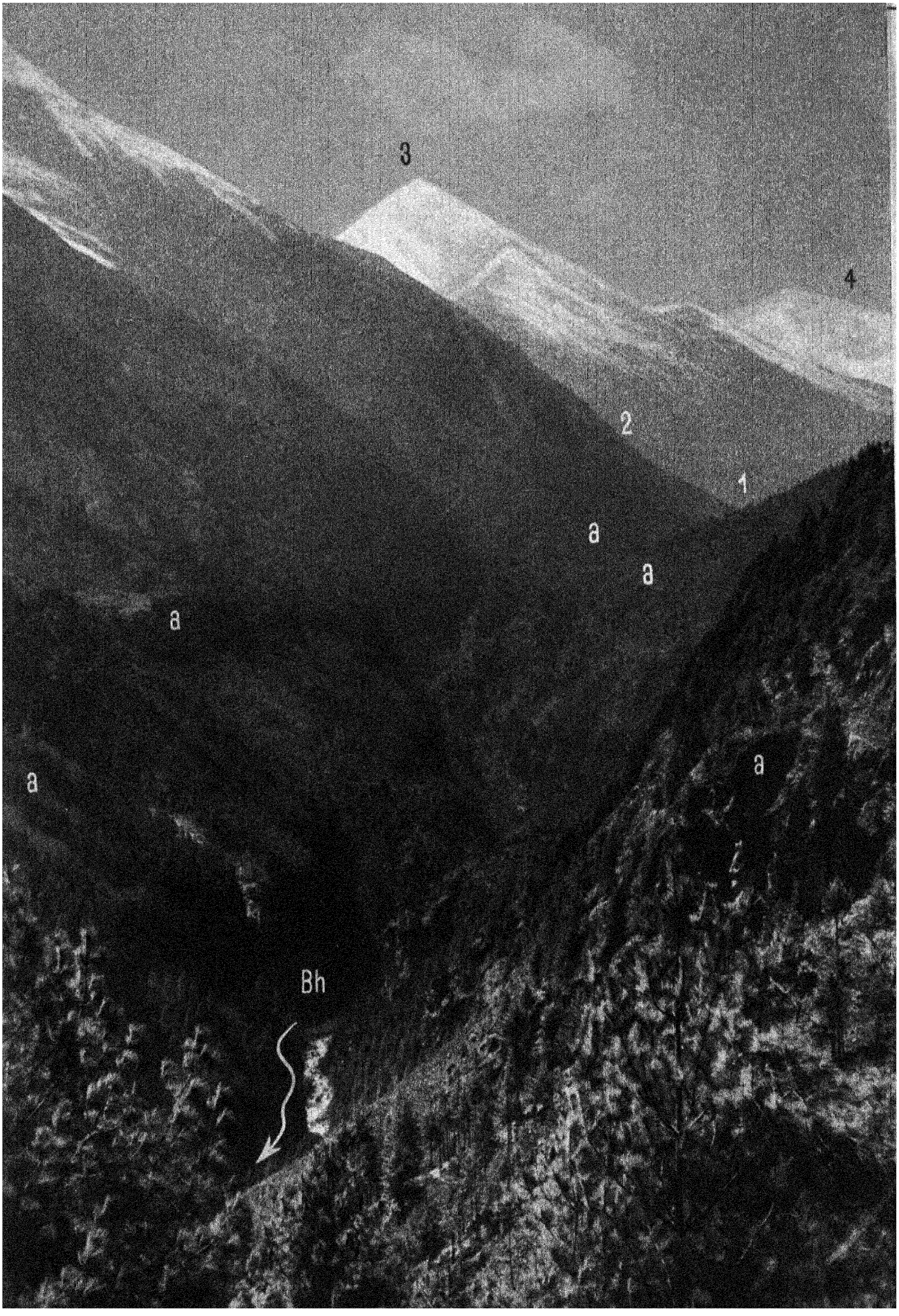
From the two sides of the Namche promontory the two rivers flow at the foot of very deep and narrow gorges. In the abrupt walls which overlook them are seen the hinges of great recumbent folds, cut obliquely and stretching over great distances. Facing Namche, at the foot of the Kwangde, is a structural surface corresponding to a thrust plane. In the other direction, the Dhumbila is formed from a recumbent anticline. Briefly, on all sides the immense faces of this tangle of valleys makes possible the reconstitution of a tectonic edifice in the grand style.

(Plate 26.) On the 16th April our long column set out once more and in the evening we erected our tents at Thyangboche. From Namche we closely followed a series of terraces, sometimes structural and sometimes corresponding to mounds of sandy glacial material. At each level area and when there is enough of it to turn to account, the mountain people use the smallest plot, arranging it in terraces, planting it with rye or potatoes.

The famous Thyangboche monastery is placed upon a spur overlooking the gorges of the Dudh Kosi and the Imja Khola. Its situation at the confluence of four valleys is unique and, what is rare in this district, one can see from it the summit part of Everest, provided that the throne of the gods is not surrounded by its perpetual cap of cloud and storm. Beyond Thyangboche, one has to descend a little to cross the Imja Khola. The river gradually emerges from its gorges and at Pangboche it flows over its own alluvial deposits at the bottom of a wide trough-like valley.

Pheriche is a pasture for yaks occupying an alluvial plain. It is dominated by the great terminal moraine of the Khumbu Glacier, and one is impressed by the size of this rampart which stands about 1000 ft. above the plain. To reach the site of the base camp, we had to pass along the right lateral moraine of the glacier,

Plate 25 : View of the valley of the Bhote Kosi (Bh) taken looking upstream from the environs of Namche Bazar. 1 : Thami, at the confluence of the Thami Khola (2). 3 : Summit, height 22,700 ft. Here the river is at the beginning of its gorges. On the two sides can be seen shoulders belonging to an anterior cycle (a). Upstream from Thami, the river runs along the bottom of a valley with a glacial profile. The rocks are of crystalline schists from the Khumbu nappes. In the background the snowy crests are of granitised ortho-gneiss. They are on the Tibetan frontier.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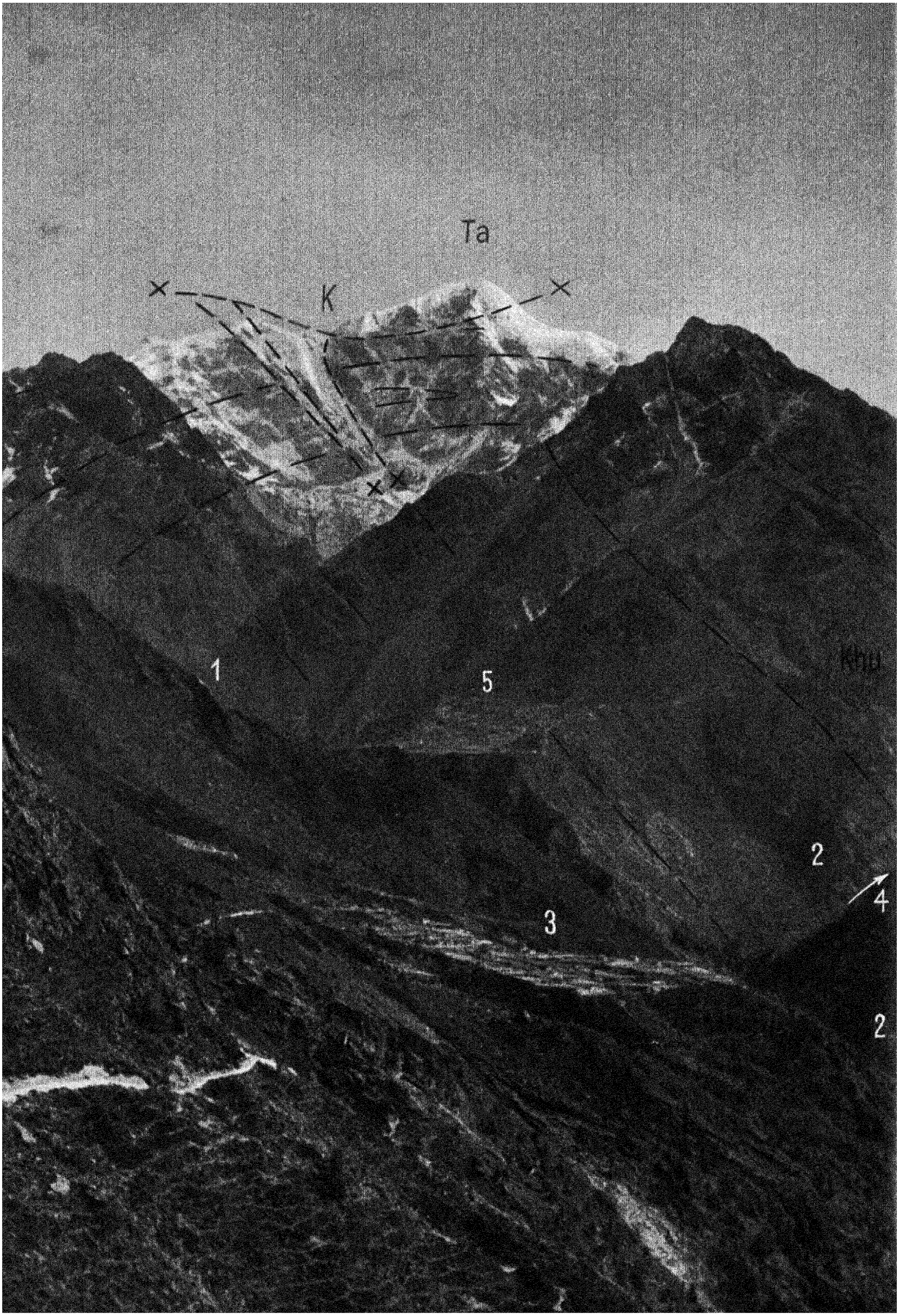
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remaining most of the time in the depression which separates it from the sides of the valley. Moreover, it was at the bottom of one of these long couloirs that we set up the tents of the base camp on the 22nd April.

The amphitheatre of the Khumbu Glacier

The base camp was on the periphery of a great amphitheatre of high summits. From Pumori to the Loh La and to Everest, the crest formed the frontier between Nepal and Tibet.

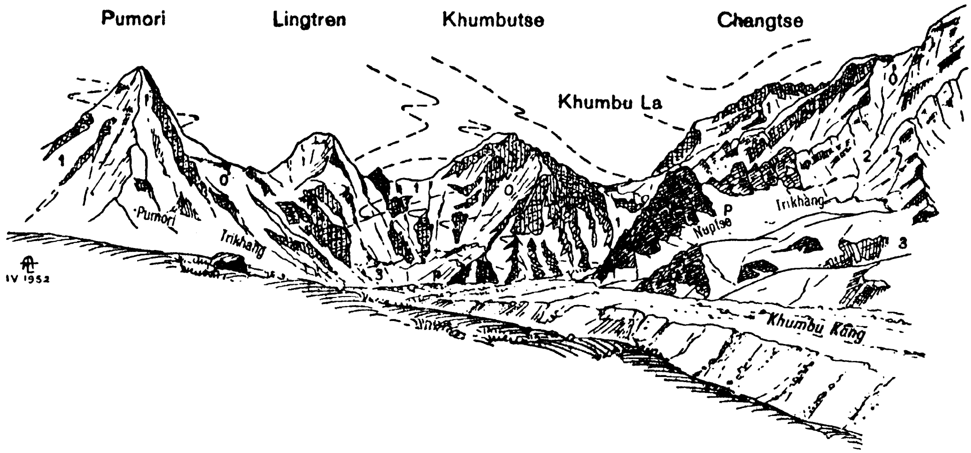
The geology of those great summits is not easy to make out, for snow and glacier cover the rock walls widely. The clouds pursue one another around the peaks almost the whole day and there was hardly a day on which a snow-storm did not descend upon us. The region can be divided into three great tectonic units.

1. The summits of the Nepalo-Tibetan frontier. These are, from west to east, Lobuje, Pumori, a shoulder of Lingtren, Loh Peak and Everest, of which only the beginning of the north-western ridge can be seen. They are of very granitised gneiss, massive and light-coloured. In this mass former transverse structures can be distinguished which are recumbent folds much obliterated by granitisation. One of them shows a hinge in the walls which overlook the right bank of the ice-fall in the Western Cwm.

All those summits, including Everest and Lhotse, form part of an even greater structural unit; the "Tibetan slab", of which the base and the section can here be seen. This slab supports the whole series of Palaeozoic, Mesozoic and Cainozoic formations of the Tibetan side. Their outcrops are echelonned more to the north following a normal thick series. This slab rises from north to south and overlaps the two following tectonic units.

2. Nuptse. This mountain is formed by a great imbricated anticline which rises under the Tibetan slab, especially under Everest and Lhotse. It pitches northwards. The anticlinal arch is in largely granitised gneiss, as well as the heart. Part of its sedimentary cover has been preserved in the small summits above the left bank of the Khumbu Glacier, at the foot of the western slope of the main summit (the Nuptse pinnacle). The thrust-plane passes between Lhotse and Nuptse, follows the gorge of séracs in the Western Cwm and cuts the spur on the north-western ridge of Nuptse obliquely to its base.

Plate 26: Confluence of the valleys of the Dudh Kosi (1) and the Imja Khola (2). In the foreground, the road from Namche leads to Tesinga (3) and Thyangboche (4, out of the picture). The villages of Tesinga and Porcha (5) are built upon old morainic terraces. In the background, the big summit is Tawache (Ta). Its upper mass is of very folded ortho-gneiss, forming a klippe (K). It rests on an anticlinal base formed of the Khumbu nappes (Khu) axised appreciably from north to south. In its turn the anticline is folded, imbricated and shattered by secondary throws.



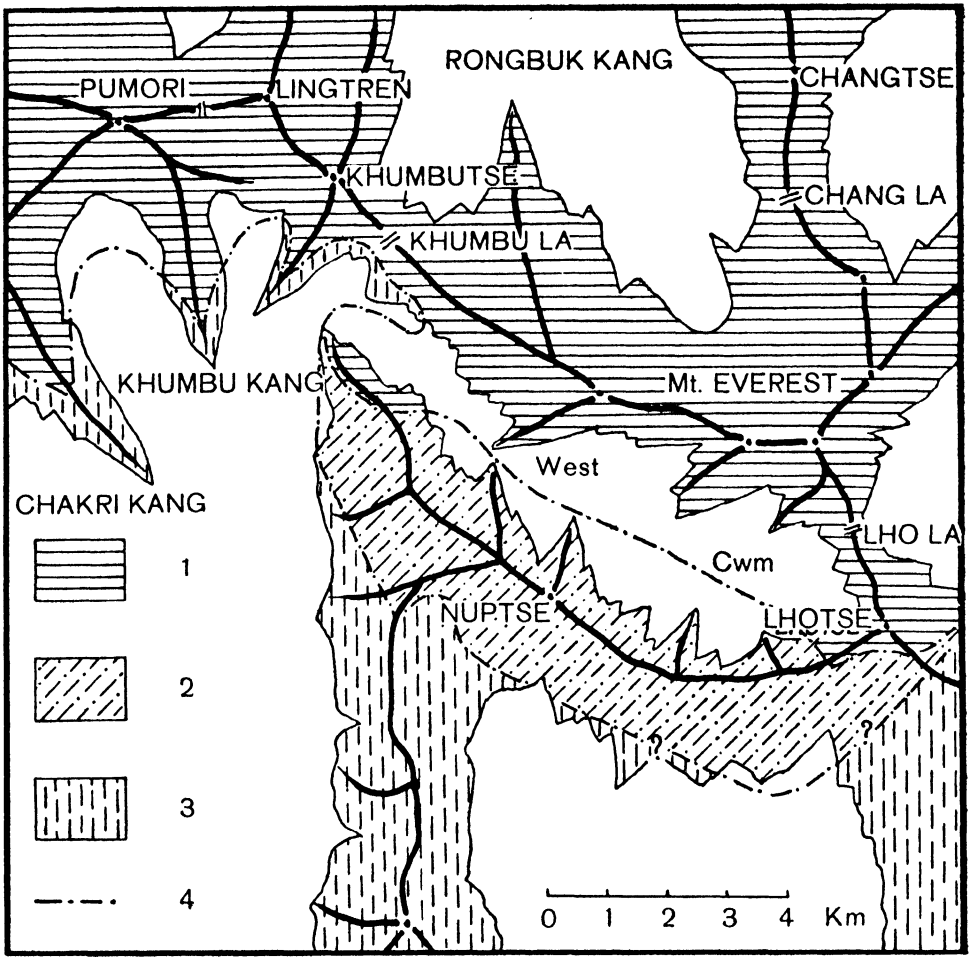
Summits to the north of the Khumbu Glacier. The summits are granitised ortho-gneiss (O). Their bed-rocks are of paragneiss (P). The whole is severely folded. View taken from the environs of the base camp. The Tibetan "slab" (1), the Nuptse flake (2) and the Khumbu nappes (3) can be distinguished.

This anticlinal imbrication of Nuptse overlaps in its turn a lower tectonic element and the thrust-plane passes across a series of low, jagged summits prolonging the south ridge of Nuptse and continuing eastwards where it was lost to my sight.

3. The Khumbu nappes. These are the gneiss and crystalline schists, already familiar since we encountered their front south of Namche, at Ghat. Their great folds, on a north to south axis, are visible in the greater part of the summits and slopes of the Khumbu Glacier, in the Chola Khola and the valley to the west of the base camp, reconnoitred by Eric Shipton in the autumn of 1951 and provisionally called by me the Valley of the Ramparts, the name given to the walls which enclose it on the south.

(Plate 33.) The sedimentary cover of the Khumbu nappes consist of sediments with triassic affinities: quartzites, variegated schists, marbles and green chloritized paragneiss. They form a series of little pointed summits bordering the base of the Tibetan slab in several valleys: the upper Chukung valley, the upper Khumbu, the upper Dudh Kosi, and the ascent to the Nangpa La. I shall designate them on the forthcoming map with the name of *Clochetons* (pinnacles), respectively of Nuptse, Loh Peak, Chukung, Cho-Oyu, etc.

The exceptional altitude of Everest. (Plates 34; 28–29–30; 27; 31–32.) One cannot regrain from relating the tectonic of Everest and its great altitude, nor of its satellites either. The Everest group is a part of the Tibetan slab, revealing a transverse culmination, due to the presence of the anticlinal imbrication of Nuptse, against which it is erected, and which is a fragment of the Khumbu nappes wedged under this slab when the last north to south alpine thrusts occurred.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KHUMBU LA
KHUMBU KANG
Mt. EVEREST
West
CHAKRI KANG
LHO LA
Cwm
NUPTSE
LHOTSE
1
2
3
4
?
0 1 2 3 4 Km

Schematic and tectonic map of the Everest massif.

The whole Tibetan slab overlaps the Khumbu nappes, but, in the axis of Everest, Nuptse has made a supplementary obstacle against which Everest (and Lhotse) is erected, involving not only the granitic and gneissic base but its sedimentary cover, of which the remains can still be found in the summit itself.

The morphology of Khumbu

A first glance at the geology of Khumbu would not be complete without giving a few details of its relief. One remark is essential: how closely this morphology follows the structure. We have just looked at the case of Everest. Lower down, the valleys are frequently parallel to the axis of fold. This is the case with the Imja Khola at Thyangboche, at Nâmche, in the upper Chola Khola, with the tributaries on the left bank of the Bhote Kosi between Thami and Namche, and the Bhote Kosi upstream from Thangmoche, and others.

Several other rivers have north-west to south-east courses, directions roughly parallel to the front of the Tibetan slab. I have already cited the network of east to west fractures in the south dip which must be more recent and have imposed the direction of several lesser valleys.

The change in the height of Everest has been much discussed. Already in 1922, the President of the Royal Geographical Society had remarked, following the communication from Dr. Heron, that it was impossible to determine whether the summit of Everest was diminishing in height from year to year due to erosion or whether there was an upward tectonic thrust which was compensating for this loss. Repeated and precise survey measurements over several decades would be required to settle the question. There is presumptive evidence to suppose a very slow rise, the result of alpine movements (0.11 mm. per year, according to F.E. Zeumer, 1950). It is based upon the freshness of relief and the strength of erosion, the rejuvenation of the gorges of the Dudh Kosi and earthquakes. It would still be necessary to demonstrate the antecedent character of the great rivers. L.R. Wager considers this hypothesis as being plausible for the Arun. I think that for the Dudh Kosi it would explain many things, notably the alignment of the lower part of the Khumbu Glacier with that of Rongbuk.

Plate 27: Recumbent folds of the imbricated Nuptse anticline, seen from the north from the top of the rip leading to the South Col.

Plates 28–29–30: Panorama of the Everest massif taken from the Shoulder of Pumori. Photograph kindly provided by The Mount Everest Reconnaissance Expedition, 1951, by courtesy of the Himalayan Committee of the Royal Geographical Society and Alpine Club. 1. Khumbutse; 2. Changtse; 3. Mount Everest; 4. Lhotse; 5. Nuptse; 6. Khumbu Glacier.

Left to right, the great structural units of the western side of Everest:

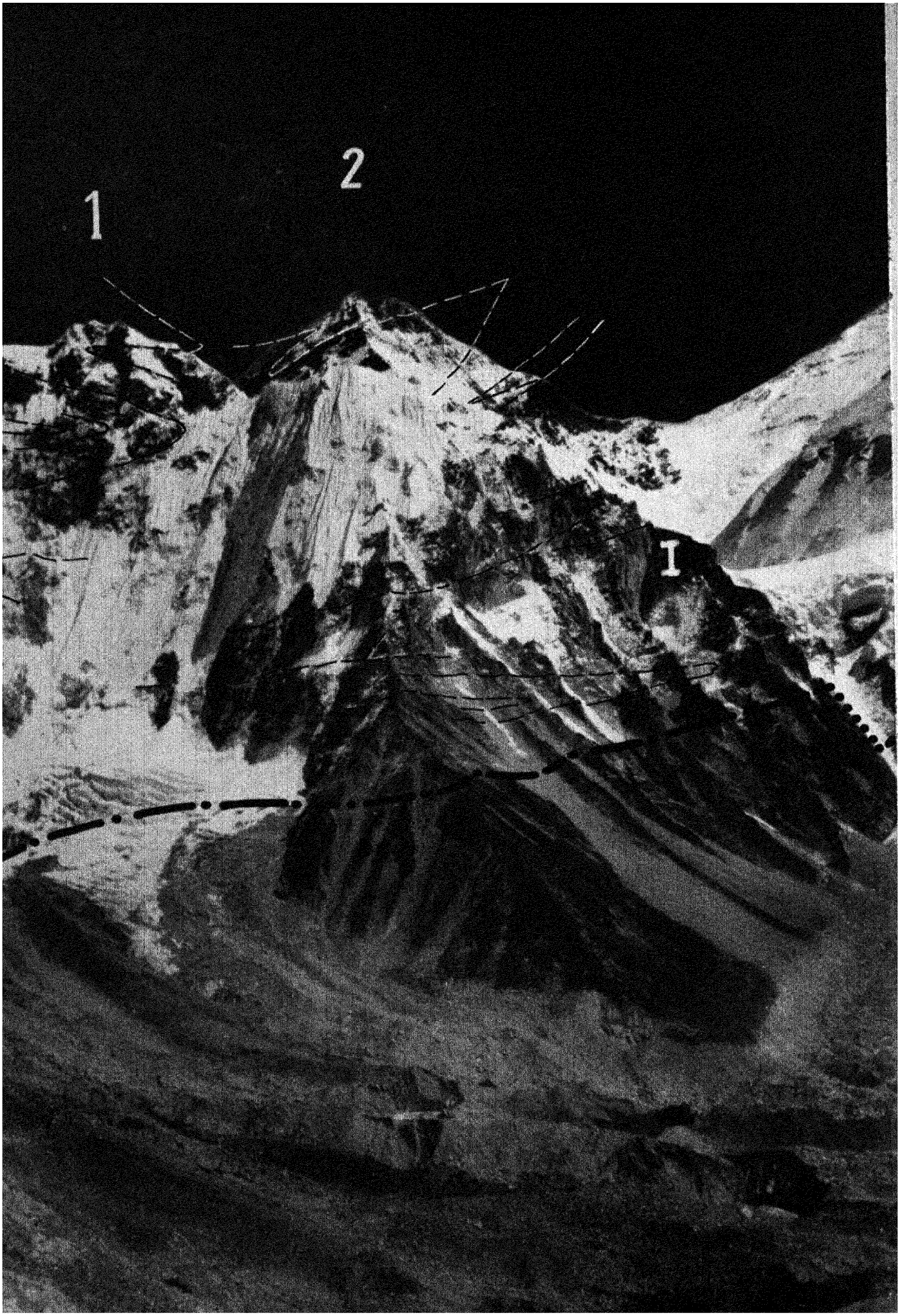
I. The Tibetan slab. In the walls of Loh Peak, ante-alpine transverse structures. The base of the western spur of Nuptse is likewise connected with this tectonic unit.

II. The Nuptse sector. Series overthrust by the Tibetan slab and in its turn overlapping the Khumbu nappes.

III. The Khumbu nappes, of which one sees here only the sedimentary part of the Nuptse pinnacles.

Changtse shows overfolds of the alpine era. By a regrettable effect of perspective, they have the appearance of fitting into the ante-alpine hinges of Khumbutse. The contact planes between the great structural units are traced only approximately.

Double plate 31/32: Counter-part to plate 27, the imbricated Nuptse anticline, seen from the south from the neighbourhood of Thyangboche. It can be followed further to the right where it extends under Lhotse.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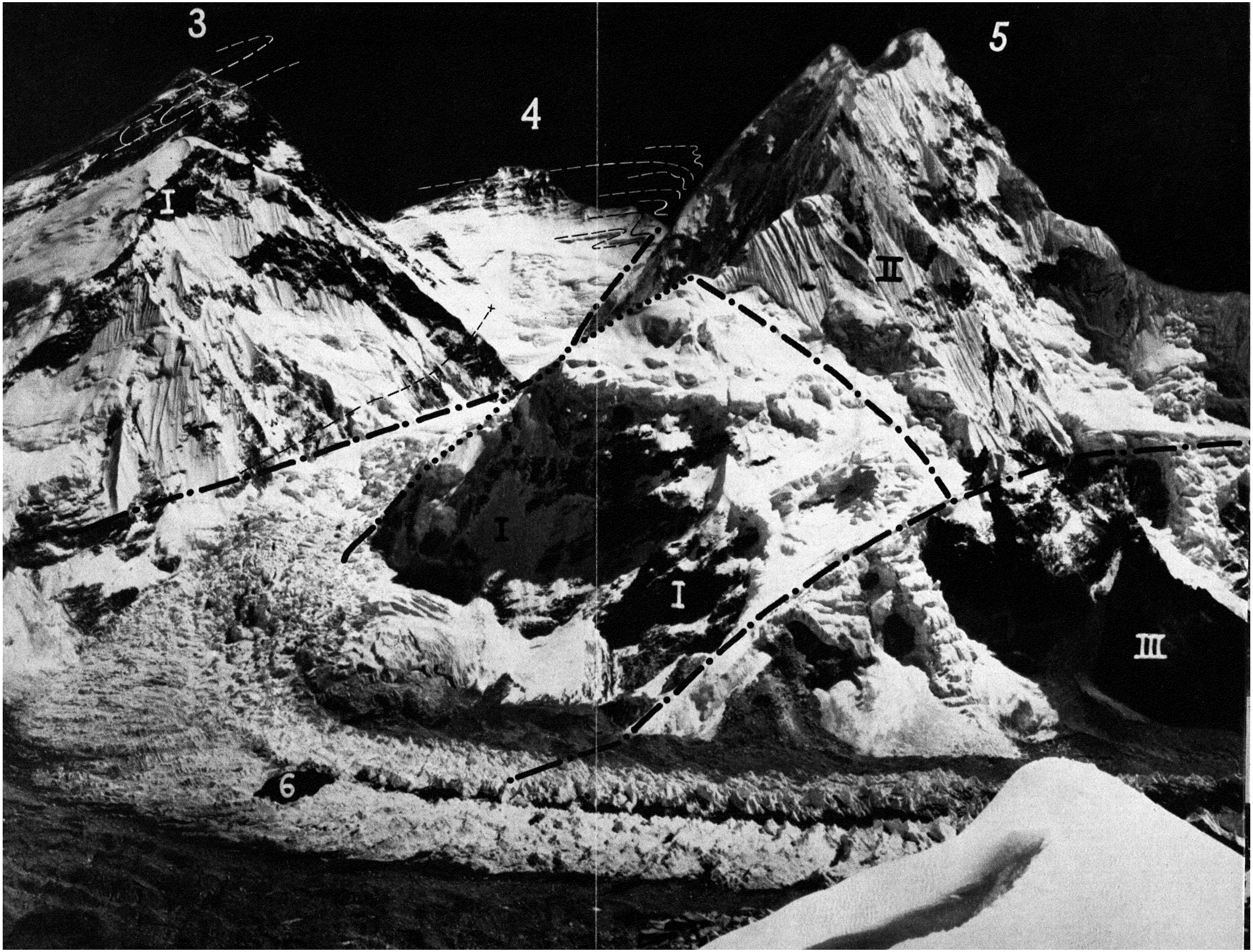

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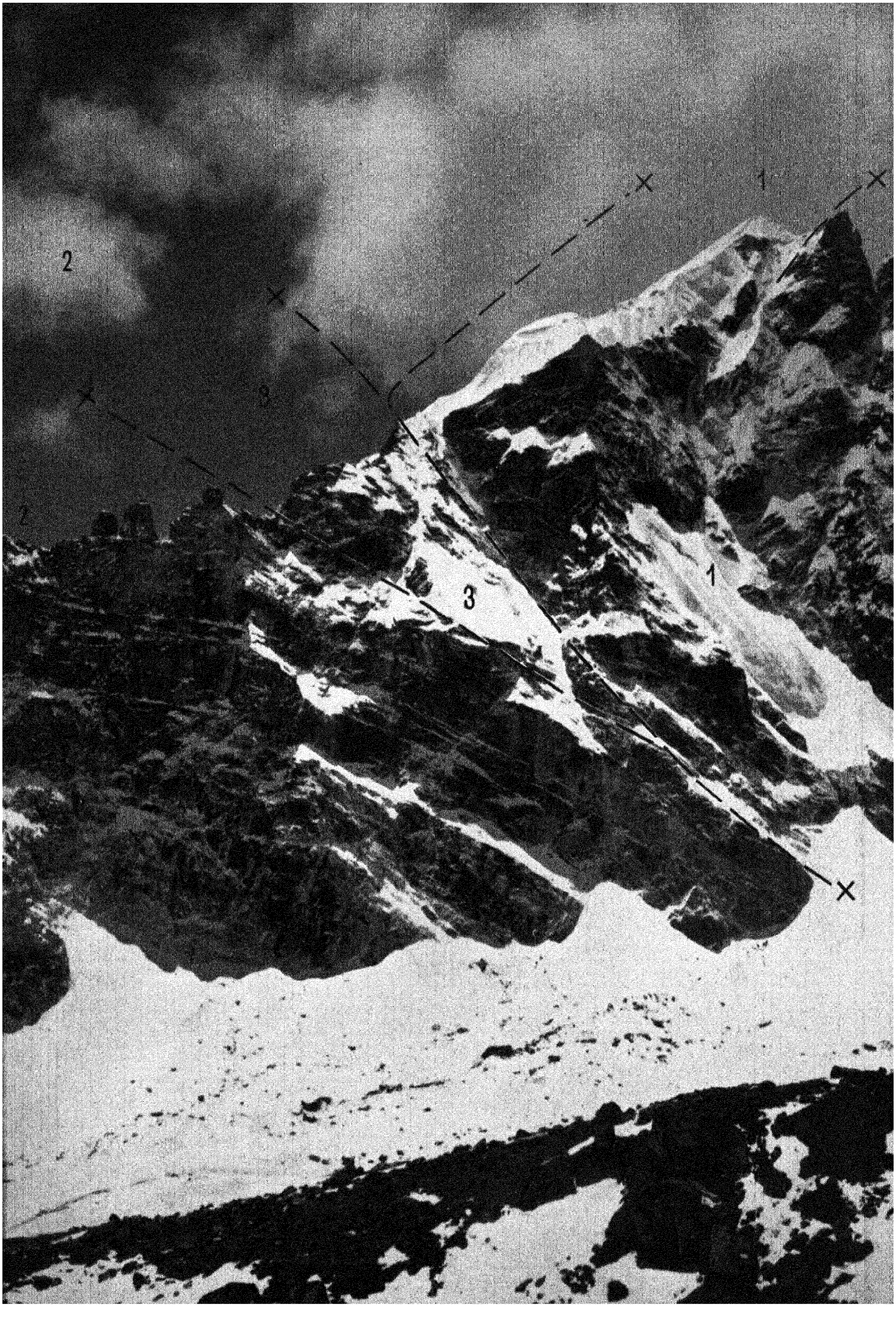
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Plate 33 (front) : Summit of the chain known as the Chakri, running along the southern side of a valley opening out to the west of the base camp. One can distinguish a front of nappe (1) overlapping the downstroke of an anticline (2) with an intermediary sector (3). The entirety is linked to the Khumbu nappes.

Plate 34 : Pass to the south of Nuptse, permitting the passage from Lobuje to Chukung. Altitude c. 17,060 ft. Rock wall on the north-west side showing an anticlinal fold strongly tectonised. The series consists of various para-gneissic schists, notably chloritised. Several beds are injected with strongly laminated aplite. The entirety belongs to the metamorphised sedimentary cover of one of the Khumbu nappes. The direction of the folds is nord-nord-west to south-south-east.

THE HIGHEST PLANTS IN THE WORLD

By Albert Zimmermann

For the climber the attraction of the high Himalayan peaks is so strong that he knows no peace until he has conquered the coveted summit after great struggles and superhuman efforts. But the botanist is content to look at the plants, to record their names, to describe them and to press them between sheets of blotting-paper in order to make at a later date a herbarium of the district visited. But if the botanist is also a climber, nothing will stop him until he has discovered, in more or less dangerous places, the smallest living thing, both in the deep gorges and at more or less high altitudes, to the extreme limit of the vegetation.

Although lower Nepal, with its mountains and valleys has been known and described for a century and a half, this is not the case with upper Tibetan Nepal. It was the interest of the scientific mission to benefit by the climbing expedition and especially by the great Himalayan experience of several of its members, even if that, *par contra*, forced the collector to a very accelerated rate of work in the approach marches. Higher up, when the job was reached, he was left alone to botanise at leisure and as seemed to him best. Unfortunately, the high-altitude vegetation when the climbers established their base-camp was still dormant. It was only the monsoon rains, together with the warm winds from India, that forced up the plants and brought them to flower. At 16,500 ft. and over we marched over carpets of edelweiss and various plants without seeing a single flower. It was necessary to redescend to the lower valleys for a certain time in order to botanize. Even in these valleys the dryness made itself apparent and it was reluctantly that I had to leave my companions. However, my aim was to collect and to observe different phenomena where no botanist had ventured alone. Those giants, those great glaciers no longer intimidated me much: I had made their acquaintance and was on good terms with them. Before reaching these localities, what countries we had crossed! If you lightly push together a cloth on a table, you will have a small relief of this region: a land of high mountains and deep valleys, where the temperature is polar on the peaks, humid and stifling in the depths. Although for this reason the marches were quite exhausting, the work of the botanist was very interesting. Before describing the plants found by "record-men" at very high altitudes, let us take a glance at a few of these plants of the lower levels.

We had all been very surprised to see the extent to which the country was inhabited and cultivated; we had in fact expected to find, from the earliest stages, dense forests filled with rare or unknown plants. Our astonishment had been great at the sight of these hillocks completely deforested and cut up into cultivated terraces on the eastern faces, while on the western slopes there were still the remains of forests of rhododendrons, oaks and conifers, to mention only the more important. Fortunately, one finds here and there, near the monasteries, fine forests clinging to abrupt slopes, in places where it has not been possible to exploit the wood and where nothing has been touched. These were real nature reserves where deer, fowls, partridges, pheasants and wild goats live in complete tranquility and are not at all frightened when surprised by man. We were equally astonished to encounter here and there fine specimens of trees and conifers, which gave us an idea of what these valleys must have been like before man established himself there. These trees are venerated by some and spared by others. In lower Nepal it is the ancient banyan which one finds everywhere in the village squares and in the surroundings. Some of these trees reach a height of fifty to sixty-five feet with trunks from six to nearly ten feet in diameter; the roots—as thick as a small tree—descend from the branches. They are consecrated to Vishnu and Shiva. Higher up, in the cleared forests or in the nature reserves, we admired some fine specimens of cypress *(cupressus torulosa)* from 65 ft. to 130 ft. high. In the region of Those and Chaurikharka, at an altitude between 6500 and 10,000 ft., the Himalayan cedar *(cedrus deodora)* points its more or less pyramidal top, from 160 ft. to 260 ft. high, towards the high Himalayan summits. Some of these giants were stretched on the earth, in process of decay, permitting thousands of plants and animals to prosper at their expense. The lamas believe that one day this tree, which gives its life and death that others might live, will return as a living being, or will even give universal understanding to other men.

For the coolie, throughout his journeys, the pine is the ideal wood for lighting a fire in order to make his famous tsampa and tea. He mutilates it with his khukri, cutting it always in the same place, so that the resin will run out. As soon as the tree falls, victim of too many mutilations, the native makes cuts in another trunk. The first pines we met were those with long leaves of 8 to 12 inches joined together in threes *(pinus longifolia)*. After rain or great humidity, the sight of these pines is somewhat sad: the bark comes off in sheets, the needles form little brushes and hang along the branches. But in sunshine the forest is majestic. Higher up is the Himalayan pine *(pinus excelsa)*, a pine that resembles the alpine arolla in its leaves, which are joined together in groups of five; but its cones are six to eight inches long and fall. We found them as far up as the monastery of Thyangboche. In the same region the Himalayan fir *(abies Webbiana)* is found up to 13,000 ft. and ranges its purple-bluish cones along short branches. In front of certain lamas-series above Namche Bazar a few fine specimen of juniper are still found, from six to twenty feet high *(juniperus recurva)*. Higher still, in the stony pastures, on all the slopes and up to nearly 15,000 ft., it is the dwarf variety of this juniper, in several forms, which the natives use as fuel for heating. Climbers, including myself, have made ample use of it. At these same heights, the ephedra *(ephedra sikkimensis)*, a small plant closely related to the conifers, gives a great deal of trouble to the mountain dwellers when it breaks into their fields; in fact, the soil is cultivated up to very high altitudes—at Pheriche to 13,600 ft., at Dingboche to 14,000 ft., and at Chukhung to 14,440 ft. The efforts of the natives attached to their land at such high altitudes and those of the plants which grow there (barley and potatoes) are worthy of admiration.

Beginning with our departure from the capital, and as far as the base camp or even higher, grouped in dense forests, especially on the western slopes, in small groups or in isolation, vanishing in the deep valleys where the warmth and humidity does not please them, but reappearing as soon as the ambient air suits them, the rhododendrons were our constant company. The memory of these forests, where the trees reach to six, ten, thirty, fifty feet and more, is something one will not forget. The rhododendrons with the bizarre names given them by the botanists, with flowers of white, rose, red on yellow, single or in bunches of three, five or twenty-five to each stem, with small or large leaves of from one-fifth of an inch to ten inches long, are surely the Himalayan plants *par excellence*. One cannot portray a scene without them. The species which grow between 13,000 ft. and 19,500 ft. are still numerous. Those which decorate the western or northern slopes of the Imja Khola or Dudh Kosi above Namche Bazar are the *campylocarpurm* rhododendrons with spotless yellow flowers and the *Rh. Wightii*, with red-spotted yellow corollas, grouped in bunches of ten to twenty. These two rhododendrons, six feet tall or more, whose flowers give off a slight odour of honey, as well as the *Rh. Hodgsoni*, with delicate pale or rose flowers, like to associate with the Himalayan firs or birches. All this vegetation is covered with long lichens *(usnea longissima)* of more than three feet, giving these already wild regions a mysterious and striking appearance. The smaller-flowered species, like those which cover all the high plateaux, the *Rh. Anthopogon*, with straw-coloured flowers which have an already faded look before they are completely opened, form, together with the *lonicera* and contoneasters, real barriers; their scent, reminiscent of turpentine, comes off when they are trampled on. The *Rh. lepidotum*, with small yellow or purple flowers, is a migrant. It prefers open rocky places; in the valleys lower down we found it at about 6500 ft.; it attains to five or ten feet, while at about 16,400 ft. it is only a little shrub. One of the prettiest species is certainly the *Rh. setosum* with large mauve flowers and small leaves. It forms real little bushes of eight to twenty inches in the turf or in open rocky spots. That which has established the highest life is the *Rh. nivale*—the rhododendron of the snows—with rose-coloured flowers, almost mauve, seen above Camp I at about 17,700 ft. It is found on all the mountain slopes of the Tibetan frontier and in the wooded valleys of all the Himalayan mountains between 13,000 ft. and 19,500 ft.

Though the rhododendrons are well represented, so also are the primulae. In certain regions the whole landscape seems to be tinted violet—the fields, the rocks and even the houses—so densely has the primula with purple-blue flowers *(primula bellidifolia)*, with dense and compact heads, decorated the least nook. In the cooler places the denticulated primula, with brilliant rose flowers, mingles with the *Pr. sikkimensis*, which has numerous pale yellow flowers. This species climbs up to 16,500 ft. It is the same with the primula of the snows, whose dark violet flowers and floury leaves are found in the rocks near Pumori.

I would not want to forget the smallest, that which forms thick carpets an inch or two high, with little rose flowers turning to white and climbing up to above Camp I at 17,400 ft. And how many others there are, with white, rose, red or violet flowers, that one would like to describe! How diverse their colours, their shapes and the spots where they grow!

Not to mention the Himalayan poppies would be a grave omission. Many amateurs try to acclimatise them in their rockeries, but not without disappointment and with reason. Over there, it is only at high altitudes that we meet them, always in cool and acid land, near to moraines or scree, or in association with other plants. On my first ascent to the base camp, there were only the withered stems of the preceding year; but on returning from the second ascent, in the Pheriche alpage, the single-leaved poppy *(meconopsis simplicifolia)* showed me its sky-blue corollas, as fine as tissue paper. It stands on an eighteen-inch stem above the yellow and violet rhododendrons. Near Tanga, on the return journey, and above Ringmo, between 12,000 and 13,000 ft., were discovered the largest poppies, resembling single-flowered, mauve-blue peonies more than four inches across *(meconopsis grandis)*. At its side, along the river, amongst the debris, we found the slightly less developed *meconopsis regia*. Our coolies and Sherpas had a taste for the young inflorescences of this greenish yellow poppy. The stems reached as high as 5½ ft.

Let us now return to the neighbourhood of the glaciers. Fortunately for the botanist there are the moraines, for the glaciers we followed or traversed near the base camp were covered with sand, with great blocks of stone, with mud and little lakes. They gave us the impression of a long lava flow, while along the moraines, the mosses and lichens were established, seeds germinated, lived and rooted themselves deeply, holding the earth together. Once these are settled, other plants quickly propagate themselves there, like workers filling in a breach in the dyke. Nothing is more beautiful than the sight of these moraines formed by innumerable specimens of variously tinted rocks, where little rhododendrons, androsaces, sileni, saxifrages, potentillas, anemones, ranunculi, primulae, veronicas and many other flowers seek the spots or the aspects which suit them best. But how all these live at above 16,500 ft. leaves me amazed!

At home, in Switzerland, the permanent snow begins at 10,000 ft. At Everest we reach it between 18,000 and 19,500 ft. The dozen kinds of phanerogamia which one can find at home between 13,000 and 13,750 ft., here become some hundreds that find it possible to live and propagate themselves up to 18,000 till 19,500 ft. and higher. One must remark, however, on one thing: our own fields compose a palette of varied flowers, our rocks are decorated with species which are all different, our marshes contain innumerable riches because of the geological configuration of our land, while in Nepal everything is on the same scale as Everest. Everything is in large masses: the flowers and plants are more imposing than at home, but they are always the same plants all along route! The acid soils and the dryness produce the monotony of the masses observed in this country; yet for him who passes through for the first time, how many new things there are and, above all, at the heigher levels, what problems there are to solve!

Dressed—or rather, muffled up—in all the clothing I could find, in the tent at Camp I I was waiting for Dr. Wyss-Dunant who had to come down from Camp IV; luckily, I had brought some little stoves for drying my plants. These made it possible to raise the temperature during the night by a few degrees, but I did not dare to sleep for fear of seing the flames spread to my sleeping-bag. On the previous evening, I had gone out alone to botanize and especially to discover the limit of vegetation in this country. He would be a very clever fellow who could tell you! On the moraines, against the rock walls at from 17,000 to 17,700 ft., one could still see plants in the immediate vicinity of the snow. But the question is: how these plants could subsist. All around was white with snow and ice, the glaciers below, séracs in front and above. When the sunlight reached to 17,000 ft., the thermometer exposed to its direct rays against the rock walls recorded 55° C. at the surface, and exposed to the north, 15° C.

At Camp I at midnight on the 21st May, the thermometer registered -9° C.; at six in the morning, -8° C.; at 7.30 a. m., 5° C. in the shade and 8° C. in the sun; at 10.30 a. m., 35° C.; at noon, 25° C.; at 6.00 p. m., zero; at midnight, -3° C. The camp was completely surrounded by ice in pinnacle form; we were at the period when the glaciers and séracs were beginning to melt. Therefore, there were only a few hours each day—and that for a few months—during which the plants could grow and flower; their seeds often matured under the snow.

The tracks having been made, I returned and the next day I left with my Sherpa and two other natives who were going to provision Camp III. We marked out the route with the remainder of the flags, for the séracs were beginning to melt and fall: we also took along some poles in order to make safe the crossing of certain small crevasses which had opened the day before. What was I going to do up there? The mountain demon had possessed me. In order to try my luck a little, I had taken the excuse of carrying the mail up to the climbers. What a pleasure it was, in the evening, to see Hofstetter and his Sherpa arrive to collect the letters and some of the victuals! It was a moving encounter. Next day came the unforgettable and grandiose crossing of the Western Cwm: before reaching Camp IV, I thought I had lead in my boots, and when I saw the Sherpa advancing effortlessly with his load on his back, I had to clench my teeth, envying his ease and finding consolation in telling myself that he was already acclimatised! A fine night at −15° C. and the botanical demon reasserted his rights. Watching Flory, Aubert, Lambert and Tensing through glasses, making a new attempt on the South Col, I saw large dark patches cleared of snow on the south face of Everest and a moraine on the glacier between our camp and Camp V. The next day, 25th May, I set out with Hofstetter and his Sherpa, Aila, without much hope of finding living things on these dark patches. At first, we were forced to follow the usual route of the climbers, for large crevasses barred the way at the edge of the glacier; then we followed the large moraine of the Khumbu Glacier to reach the slopes of Everest. Near to this giant were nothing but yawning gaps and great crevasses. From my first glance, the diversity of the stones forming the moraine, and especially the rich detritus that composed it, revived my hope of finding a few plants. With equal ardour, we all searched the least green patch and suddenly, at 20,850 ft., a very small plant (surely an *Arenaria)*, huddled near some huge blocks, seemed to await us; I was fully rewarded for all my efforts. I took off my rope—perhaps a mistake, but it allowed me to examine this long moraine minutely. I leapt for joy, and I ran, thinking myself at 10,000 ft. But at this height I did not long continue, realising that the least effort is costly and that every movement must be calculated. How could this plant be there, alone in the middle of the ice, where the temperature is fairly high when there is sunlight, that is to say during the day? Perhaps it was the seed of plants growing higher yet. Asking Hofstetter to secure me firmly, I crossed bergschrunds and snow-bridges so as to reach the slopes of Everest, thinking that it would do no good to fall into this fathomless abyss. Hofstetter grew impatient on the glacier, but I still saw small green spots in two little fissures exposed to the south-east. Using my knife as a trowel, I was then agreeably surprised to find myself in the presence of a very small tuft of androsace *(androsace microphylla* perhaps) and, if I am not mistaken, a small saxifrage or sedum (unfortunately, while writing these lines our dried plants had not yet arrived and it is impossible to give them their true names, considering their smallness and the absence of flowers).

Returning to camp, very happy to think that we had just collected the highest plants in the world, we asked ourselves if we really were at the limit of this vegetation. However, I greately desired on the next day to climb up to the "Eperon des Genevois" to ascertain whether there were not some mosses and lichens there. Not being equipped for a greater altitude, it was with heavy heart that I left my climbing friends, who themselves had to continue the struggle to conquer the mysterious Chomolungma.

Mine was the descent, the return to pursue the observation and collection of plants. Despite the hard work which this entailed for one person, in broken and mysterious country, I thought of one thing only: to return there another day. For the climbers, the call of the peaks; for the botanist the call of the flowers around the peaks.

A JOURNEY TO THE GOSAINKUND (NEPAL HIMALAYAS)

By Ella Maillart

At the beginning of April 1951, I landed at the Katmandu airfield with the intention of taking a close look at some remote Nepalese village as near as possible to the tree-line: its daily activities would be similar in many ways to those of the Swiss village where I live (the second highest in Europe) and where the tiny fields are poor and the mountaineers must work hard merely to survive. An interesting parallel could be drawn.

Fear of leeches made me choose the season before the monsoon. Furthermore, I needed the Spring, with the rhododendrons in bloom, for my colour-films, but I had not foreseen that already in March and April the blue sky is filled with heat-haze rising from India, spoiling the view and the light.

The valley of Muktinath, visited lately by the French and the English, offered me good possibilities, among them girls in colourful costume. It would take fifteen days to reach that part of Nepal. But I had hardly given my letters of introduction to the Maharajah-Prime-Minister, when the capital was upset by new troubles. The Prime-Minister lost most of his power. The few Englishmen living in Katmandu thought I had but a faint chance to do what I wanted. The Nepalese I met were charming and said that, since I had come so far, they would not disappoint me by forbidding a journey into the mountains. The problem of finding an interpreter remained to be solved. I was told that my entrance-visa would have been withdrawn had I not landed five hours before the troubles.

The situation remained vague as well as threatening. My fate fell into the hands of the Home-Minister, who supported the Congress Party which opposed the Maharajah's Party of the Ranas, or princes. With sad feelings, but in order to propitiate everything and everybody, I studied my map and chose the shortest possible tour, that is to the north-east, in the valley nearest to Katmandu; and I dismissed the Sherpa I had engaged in Darjeeling, since I would not reach the Tibetan border.

Following a long ridge to a spot called Saone Mani at an altitude of about 12,000 ft., I proposed to go down some 4000 ft. to Malemchi and eastwards across the valley to Tarkhe Gyang, villages on the upper course of the Indrawati river, a branch of the great Sun Kosi. These two places, inhabited mainly by

Sherpa tribes, were among steep forested slopes. But from there, in such a trough-like valley, a snow-mountain would hardly be visible.

Bill Tilman had touched Tarkhe Gyang on his way back from Langtang over the Gangja La in the autumn of 1949. Being higher than 18,000 ft., that pass is only used in August and September. I intended to climb to the foot of the Gangja La and, camping there, wait until a clear sky allowed me to film some great snow-mountains.

Colonel and Mrs. Proud of the British Embassy were most helpful to me, a newcomer. They gave me details about the track to Saone Mani. The rest I gathered from the Lama of Bodhnath, at the greatest Tibetan Shrine outside Tibet. That charming and most lively man speaks his own English; he spends every summer in the tiny hermitage above the village of Malemchi, which belongs to him.

It looked as if my "expedition" would be a mere excursion devoid of the seriousness conferred by crampons, rope and ice-axe. But altering my plans, I ended by visiting the sacred Gosainkund—the lake of the Religious—beyond a pass 14,800 ft. high (quotation by Dr. T. Hagen), to the north of Saone Mani. Mani, meaning "Jewel", is one of the words in the principal Tibetan prayer; used geographically, it indicates a Buddhist monument. The few classical books on Nepal mention that sacred lake, but I am most probably the first European to have been there. Nepalese officials are very orthodox Hindus and they have never allowed foreigners to join the Shaitive pilgrimage to the Gosainkund. I did not ask for permission, and went there, as it were, unintentionally, when the lake was under an impressive armour of ice and snow.

It was a most interesting tour, especially now that I have partly forgotten the mad track of the steep path which descended, time and again, after each long and hard ascent. More than once I thought that the main result of mountaineering is to make you rave for your evening cup of tea. Ponies are useless in these mountains and the numerous caravans I saw were formed entirely of men. A massive or aged person has to travel on a man's back, even when there are nothing but precarious footholds in slippery gullies. In country as steep as this, one must not forget to cut one's toe-nails as much as possible so as to avoid sore feet!

I had with me a small tent, a good sleeping-bag, a pneumatic mattress, a petrol-primus, a rucksack with three cameras, thirty pounds of Kodachrome 16-mm. films—altogether two coolies' loads (contained in two bamboo-baskets with pan, mug and provisions). Lastly, I bought food when I was certain of starting: I was to be accompanied by Lt. Malla, the best possible interpreter, lent me by the Army for three weeks. The Government had not approved my idea of travelling with the Lama of Bodhnath.

Milk, eggs, butter and *tsamba*[1] could be bought on the way. I went to the bazaar to buy tea, dried apricots, raisins, cashew-nuts, rice, puffed rice and *churia* or local rice-flakes most useful as a ready meal. My bill came to twelve rupees—less than a pound. Mrs. Proud gave me sugar.

And then we started... with only the weather to worry about: day after day storms were blackening the hills surrounding the valley.

With Lt. Malla were three men: an orderly, a sergeant and a Brahmin cook. His army equipment being heavy, he needed five coolies altogether. To the eyes of the Nepalese who saw us, he must have looked like a sahib, sitting at ease on his spotless camp-bed, under his big double-fly tent, waiting for his meal to be served, while I squatted in my tiny tent, crying over peeled onions, inflating my mattress, or else cleaning my pan! I joked with Malla, telling him that his new Government wanted to introduce democracy into Nepal: I had surprised people by turning up everywhere on a hired bicycle even when I called on the King (gone are the days when one went to Nepal as a guest of the Maharajah!) and I added that I was well qualified to demonstrate the inelegant ways to which I was well used in the West...

I was driven in style to the foot of the hills at Sundari Jal, the water-works of Katmandu, in the station-wagon of the British Embassy. Our seven coolies were there and we began the steep climb up the Sheopuri Ridge, among tiers of tiny terraced fields. The wheat being harvested, maize and potatoes were sown.

Many peasants were coming down the path, leading goats and kids to the capital, or carrying loads of planks, charcoal, bamboo baskets, even bags of medicinal plants, or paper made from the bark of the daphne. All these men were bare-legged and I saw the powerful muscles of their calves and thighs, always hairless. Girls of the Tamang tribes wear ample skirts and many necklaces of red beads. Long trains of coolies carried huge bundles of green foliage as fodder for their buffaloes—like a moving forest.

It rained so heavily during the first evening that Malla gave one fly of his tent to the coolies, who usually sleep in the open by a fire. I had decided to camp in a clearing looking towards the north-west and the Himalayas, so as to miss nothing of the short cloudless moment at sunrise. Also, I always try to avoid the proximity of villages where people, dogs and smells can be a nuisance.

Next morning the panorama was unforgettable: Ganesh Himal to the west, the Langtang peaks and Gosainkund Lekh barring the northern sky and the range of Jugal Himal spread out in the east. We followed our ridge down to Pati Bhaniyang—the Pass of the Shed—where on a narrow saddle our north-south track crossed one running east-west. Then up our ridge again, enjoying a vast horizon before going down to Gul Phu where, frightened by a heavy storm, we pitched an early camp. The coolies found shelter in the hamlet where Malla bought a hunk of deer shot by a hunter.

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[1] Roasted barley flour.

The third day's climb was a steep one, among terraced fields newly won from a dying oak forest: tall and stripped, the gnarled trunks looked like desperate stumps praying to heaven! Higher up, the forest was still alive, fairly healthy but pathetic, most of the branches having been lopped off. There in the wood, I saw for the first time a pale green flower looking like a cobra's head, which Malla called "banko". I saw, also, dark blue berries clustered round the central stem of a bush: it was the sour-sweet *juan madro*, called "the cherries of the Solo Khumbu Sherpas". On our way back, the shopkeeper at Pati Bhaniyang offered us a tray of *kaphul*, a dark-red fruit like a small strawberry, but with a blue stone at its centre: this was *myrica nagi*, allied to the sweet gale or bayberry.

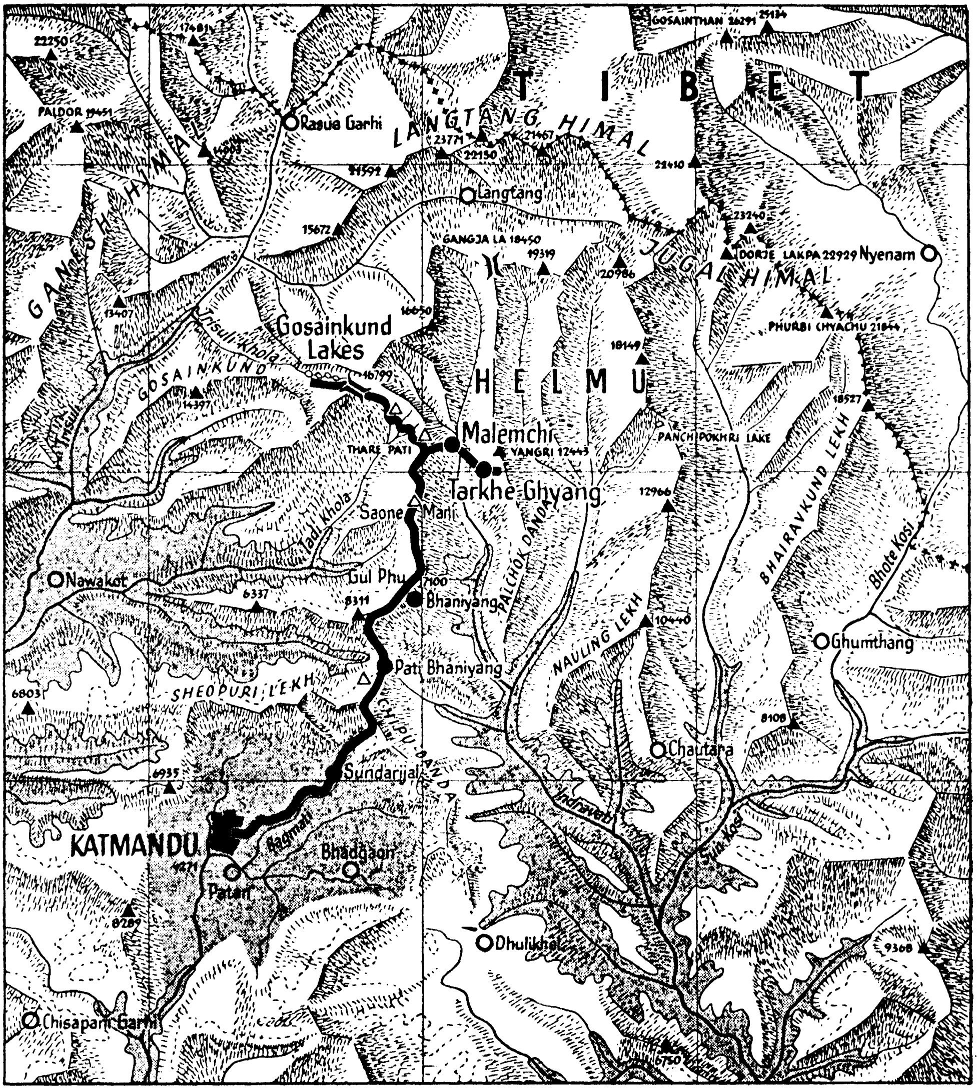
The first shepherds I saw were camping under bamboo mats, shaped like a tunnel. One woman went on weaving, sitting on the ground while we drank curds. Just above that tiny camp we saw the beginning of the rhododendron-forest, where the white blossom was already faded. The coolies walked very slowly that day and we decided to camp early in the hollow of Karka Bhaniyang—the Pass of the Pasture—where there were two empty shelters. By then, and after having observed Malla, I trusted entirely the decisions he wanted to take.

Among flowering bushes of mauve rhododendron I camped on a small eminence with my tent facing the Himalayas. Near by, a tiny blue bird, of king-fisher blue, sat by the side of a blood-red cluster of rhododendron. It was a perfect camp. Next morning, the snow-mountains were clearly seen for a while, not very far from our ridge.

By noon on the fourth day we reached Saone Mani, some 12,000 feet high: a *chorten* on a small level space on our knife-edge hill, decorated with the engraved prayer *Om Mani Padme Hum*. It was such a magnificent spot, the air was so bracing, the proximity of snow-mountains so exhilarating, that I decided to postpone our plunging down into the abrupt Malemchi valley.

Malla camped with his men in a tiny shed and the Katmandu coolies were sent back. The sergeant went down to Malemchi with a letter of introduction given to us by the Lama of Bodhnath, to fetch cheaper coolies as well as eggs, milk and water. Luckily, before his return, the Brahmin cook found snow in a cold gully; for the sergeant lost his way, met a bear in the forest... and only came back to us on the next day.

In the afternoon, moving through a wild, free wind, Malla and I went higher on our ridge, following a giant's causeway leading to a pyramid of turf. A wild goat watched us, pheasants rocketed down; young bamboo shoots, dwarf junipers and budding rhododendron bushes grew in sheltered places. Enchanted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NAULING LEKH
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Ghumthang
Pati Bhaniyang
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SHEOPURI LEKH
CHIPU DANDA
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Indrawati
Sun Kosi
KATMANDU
Bagmati
Bhadgaon
4271
Patan
8289
Dhulikhel
9368
Chisapani Garhi
6750

by our narrow mountain and its wilderness, I planned to follow it northwards during the next day. According to what I could remember of the wall-map I had studied at the Embassy, the pilgrims's way to the Gosainkund followed our ridge to a pass leading into the remote Trisuli valley of the marvellous lake.

To the south-east, tiny among a few terraced fields, I saw Tarkhe Gyang, the only inhabited spot I could detect in the big valley at our feet. Malemchi was too directly below us to be visible. Above Tarkhe I saw the whole length of the ridge, parallel to ours, leading up to Tilman's Gangja La... and it looked a rather tiresome climb. Why go so far to look for the snow-scenes I wanted for my film? I might find them nearer at hand and thus avoid a dreadful ascent.

After a very cold night, the next day brought some surprises. Leaving the cook to look after the camp, we followed a path, deserted at that season, along the top of our narrow hill, while a moving mist filled the two valleys on either side. Reaching a combe facing north-west, and seeing a few dilapidated stone-shelters, we knew that we were at Thare Pati; on the ground, hardly freed from the snow, the tiny potentilla plants still looked crushed and dead.

In the hope that the midday sun might absorb the mist, I pushed on with Malla and Dammari, his orderly. The track looked pleasant, though, now and then, it crossed snow-gullies cut into the north-west slope of our mountain. Malla enjoyed the snow as much as myself, but not so his orderly, who was most careful, even distrustful, having never walked on it before. As we progressed, the depth of the snow increased and also the steepness of the slope, which became precipitous. The track had vanished.

Far away and below us to the left, we had glimpses of a path going down to the north-west into a deep and rocky horse-shoe valley; Malla thought it was the pilgrim's way. But hoping that we might have left it to our right, on top of the ridge, we climbed up there, on all fours part of the time—in case I was right. Since we were fairly high, the pass to the lake might be quite near.

There was no way to any pass up there. But I met the "soondope" rising above the snow, a dwarf rhododendron, brown and dead still, but full of an enchanting fragrance when warmed.[1] We turned back towards our camp. If Malla was right, why not make for that north-west gorge next day and explore?

But back at Saone Mani, we soon learned that our new coolies—four girls among them—had come without food: we were therefore obliged to start at once for Malemchi. Topgi, a smiling Sherpa carrying a muzzleloader, had been sent by the village headman. He held a pair of town shoes in his hand: no doubt he had meant to create a good impression, but a huge blister on his heel forced him to walk barefoot as usual. Unlike the bare-legged peasants, he wore Nepalese trousers—narrow at the knees and baggy higher up. In summer he traded with Tibet; in winter he hunted deer, foxes, hares, pheasants.

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[1] Used for making incense sticks

It was with Topgi's help that we visited the two villages of that upper Malemchi valley, both of them built at an altitude of 8000 ft. There, even the poorest houses have their facades of dry stones brightened up by the wood carving of the three traditional windows; and on the first floor the shelves and panels of the living room are also decorated with carvings. The Buddhist shrine occupies the main corner by the window, above the low and hard bed, covered with a bright carpet from Lhassa. The ground-floor is always used as a stable.

A new guest is at once offered a bowl of the local beer or perhaps *rakshi*, the home-made spirit, while fresh Tibetan tea is churned with butter in a large bamboo tube. The open fire burns on a hollow stone in a corner of the room; and there, hanging from the ceiling, chunks of meat are being smoked. Karmu, the handsome lass, is preparing an appetizing potato-curry.

Related to the Tibetan, the language of the Sherpas is full of queer sounds. The religion is also similar to the tantric Buddhism of Tibet. But in Nepal, rich men can have two wives, like the king. And it was the second and most matronly wife of the Bodhnath Lama whom I saw being carried on a man's back, up and down a slippery and precipitous path.

While trying to find out how cheese was made, I was much surprised to see that the cattle—a cross between zebu and yak—were left to wander in the steep forest, since the few pasture-grounds, high up on the top of ridges, were not yet covered with grass. At night the cows were tethered behind thorny hedges to protect them from prowling leopards. Clarified butter is first of all produced from curds; and then, after more churning, a white cheese called *siri* is made—I was amused to remember that in Valais we call that same cheese *séré* or *sérac*.

In order to call on the sister of our Sherpa in the village of Tarkhe Gyang (Gyang means temple), we crossed the upper course of the Indrawati river, where a bridge made of tree-trunks had been carried away by the floods of the last monsoon. Ploughing was going on energetically in the narrow fields where rye had been harvested. And on a shelf of hard-beaten earth at the entrance of Tarkhe Gyang, a big beam was rhythmically threshing the grain; two men stood upon it and operated it as a lever.

We camped on the wide verandas of the temple so as to see as much as possible of the village-life. There I slept by the side of a prayer-wheel, 10 ft. high, where a tiny butter-lamp burned all through the night. Whether to turn that wheel or to look at the first European woman in Tarkhe, most of the villagers came to my room and much reciprocal staring took place!

Later I was invited to visit quite a few homes and I soon found myself distributing medicines against malaria, bronchitis, dysentery and inflamed eyes.

I received rice, flour and eggs in exchange. I was surprised by the cleanliness of well-to-do families, by the latrine at the end of every balcony, where ashes were thrown down the opening, by the homespun weaving of Lakpuri, the sister of our Sherpa, and by the natural dignity of some of the women; also by the fact that nine nuns lived in the village.

Lamas and necromancers being much in demand, as in Tibet, religion is part of everyday life and I saw how the villagers call on the few anchorites who live in cells high above the village. One of them remained invisible, having shut himself into a room for a silent meditation of three years, three months and three days, his son bringing him his daily food.

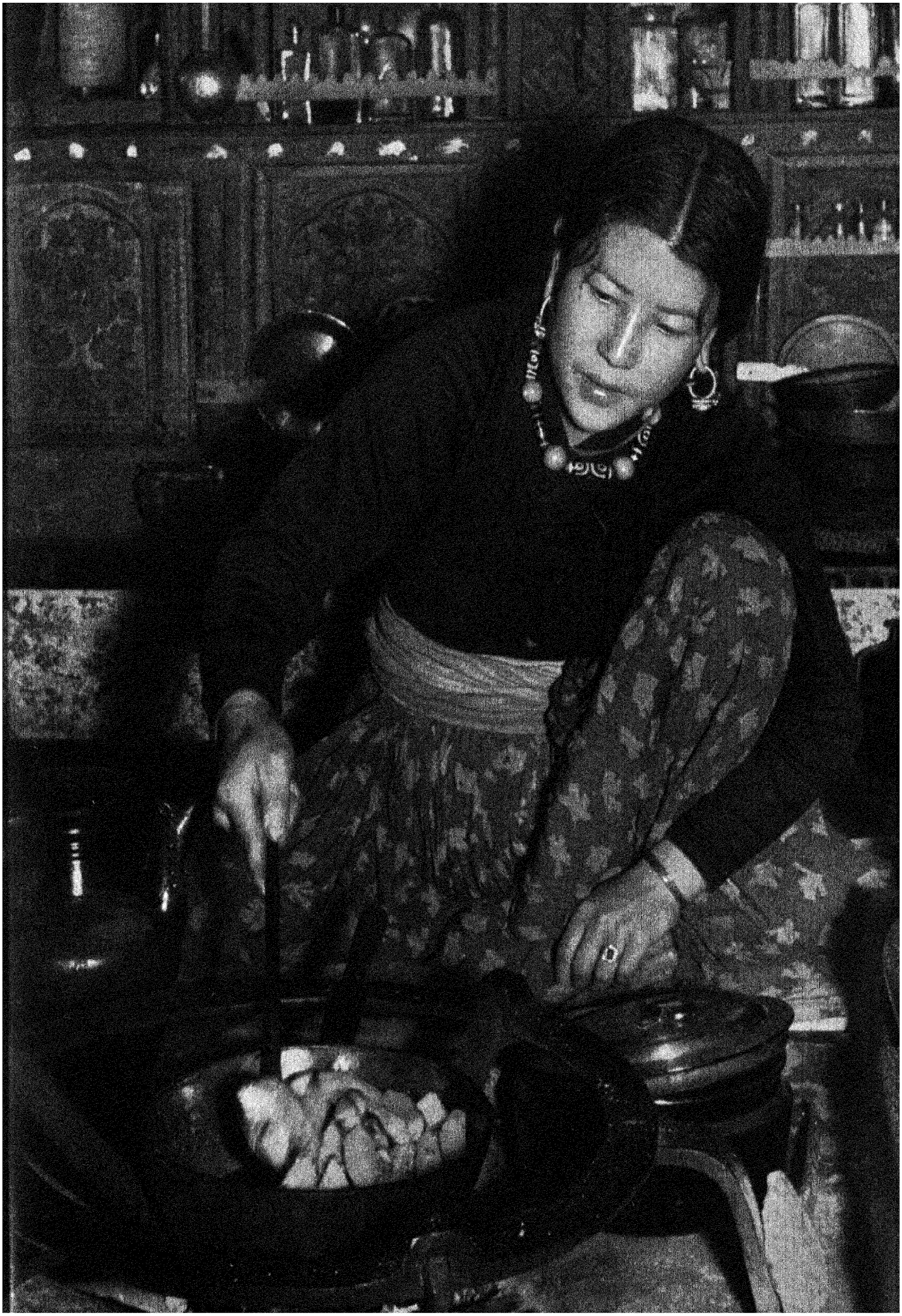
A mast with a narrow prayer-flag was planted in front of every house in the village and many cairns or shrines were decorated with the engraved prayers of the Buddhists.

The village headman, called No Babu Lama, was unwilling to organise a devil's dance for me; but I was going to watch with much interest the funeral rites performed for the soul of Pasang, who had died a year ago. All day long the male relatives of the deceased, the lamas and the *phumbo* (or magician), read aloud the text of the prayer-books accompanied by the drum, the gong, the cymbals and the trumpets of the religious orchestra, including the human thigh-bone with its shrill sound which has power over the demons. The wife and son of the dead man were most serious: the efficacy of prayer depends on the intentions of all those who are present.

It was only late in the evening, when many little butter-lamps were burning in the big room, that the reading of the prayers was completed. Meanwhile the widow had offered a banquet to most of the villagers, women being served apart in the square before the temple. I watched the many courses with impatience: as soon as it would be finished the villagers had agreed to show me their ring-dance, usually performed only at night. In vain did I try to make them start earlier, so as to film them in daylight, Topgi having added ten rupees' worth of spirits to the general supply. The sun was well below the western ridge when they started their complicated shuffling, accompanied by the singing of their repeated refrain ending with the call "*Sseu! Sseu! Phombo... Sseu!*"

Before leaving that village, I once more pushed open the big doors of the dark temple-hall, where the red and gold lacquer of the carvings shone on thick square pillars, where the painted banners, hanging from the ceiling, moved slightly in the air, scented by the burning butter-lamp, and where the old walls were covered with frescoes depicting the Buddhist pantheon.

Plate 35: Handsome Karmu is cooking curried potatoes. She wears a valuable necklace of coral beads and "zi" stones.



Filled with the desire to see more of the main Himalayan range, I climbed back to the 14,000 ft. of the Thare Pati shelter, through a fairy-tale forest, totally unspoilt. My aim was to reach the sacred lake beyond a 16,000-ft. pass.

There the god Shiva had struck the rock with his trident and the water, issuing from these three springs, had at last calmed the fever from his having drunk the poison of the Universe, after the Ocean had been churned to produce the Dew of Life.

The coolies could not go so far through the snow without fuel or shelters on the way. The tour might be done in two days; Topgi knew the path well since he always went that way when fetching sheep from the town of Kyerong in Tibet. The orderly would lend his shoes to Topgi; I had socks and snow-goggles for him; he would sleep under a rock at the foot of the Pass; only one coolie was needed to carry food, blankets and my tiny tent. I still had half a loaf, cooked by Malla according to Tilman's recipe. The coolie was to wait at that rock, in case we needed to spend a second night there on the way back.

And so it was done.

As we left the main camp, a thick mist filled our world and I had no idea what was in front of us. We tumbled down and down the savage side of the mountain where earlier we had lost our way. In every gully we disturbed a couple of pheasants and on the path which we were the first to tread that year we saw many excreta of muskdeer. I shall never forget the nine successive rocky ridges thrusting out of that mountain side, forcing the track to go up and down nine times before we reached the bottom of a gorge with a waterfall—perhaps at a height of about 11,000 ft.

It was midday. We cooked some rice. And then the mist turned into rain, hail, thunder and snow. By five o'clock I gave up the idea of pushing on and I found a flat place on which to pitch the tent. The two men crouched sadly under a rock and burned away two treetrunks which had formed a bridge across the torrent. They felt so depressed that they never prepared a supper—as I learned next day—while my Primus cooked soup, eggs and Ovomaltine in the cosy tent. To be able to sit cross-legged for hours on end is the most useful accomplishment for a camping-life.

Next morning Topgi and I took three hours to reach the Pass, which was broad enough to hold a perfectly round lake, deep under the fresh snow of the night. Keeping two Leicas myself, I had given the cinecamera to the Sherpa, and I continually warned him not to run too far ahead of me.

Plate 36: The nun Tung Sang Lamini sits on the bed, rosary in hand. Offerings are placed before the Buddhas and the holy book.

It seems that the small valley we left behind us is called Kang Zemu. The first part of the climb had been up a steep and narrow moraine where a few bushes were still growing, while patches of pink primulas took shelter below rocks. Then came the open ground where boulders, turf and small ravines alternated, the white snow melting fast on these black rocks facing the sun. To start with, the blue sky was dark and cloudless; Thare Pati could be seen high up on the ridge enclosing our world to the south. But, would the mist overtake us before I could enjoy the view from the pass? I could not hurry, for we were already above 16,000 ft.

The sun was so hot that I took my jersey off. But never did I put it on again so quickly. An icy blast from the north struck me suddenly, seizing me as if I had stepped into a deep-freeze factory. That Tibetan blast was true to type. This explains why so many pilgrims die in summer when they reach the pass where two opposed winds always meet. Sherpas call the pass "Balmu Shissah", which means "the dead Newari woman". It is probably 16,779 ft. up.

The pass led into a small valley running down towards the west. Due north and behind the rocky range just above the lake, rose the group of white peaks forming the Langtang Lirung (23,771 ft.) near the Tibetan border.

Our progress became hazardous because of the thick snow. On névé-like patches I could walk well and even slide down very fast—which surprised Topgi and was to make him say later that I could skim the snow!—but often we plunged down to our hips when passing black rocks. After the first lake—and at successive steps—there was a second and a third, equally round and covered with snow.

At last, from the top of an abrupt knoll of boulders, some 500 ft. high, the great oval of the sacred Gosainkund appeared below us, frozen into pale grey ice like armour. The lake filled the whole of the shelf-like valley and there seemed to be a vast gap beyond it, while far away in the same direction sombre clouds were lapping the foot of Ganesh Himal. Thus, all by itself, half-way between earth and sky, lies the sacred place, isolated, silent, unruffled, like the mind purified by deep contemplation.

Down and down we tumbled, till a few tiny flags between bamboo-poles indicated the slit that give birth to the miraculous waters. We drank of it and joyfully washed our faces; we were at peace with ourselves.

A few horizontal lines near the mouth of the lake indicated the long shelters used in summer by the pilgrims: these traces of human activity were very surprising in the midst of that desolate world. I have been told that the path going down to the west along the Trisuli Khola is even worse than the one we took. In August the lake is probably a rich gentian-blue; in May that sheet of ice in the silent landscape is beautifully soothing.

At half-past eleven, after an hour's climb, we were back at the pass. And this time the mist was billowing up very near us, a threat to further photographic activities.

If we hurried, we might still join the main camp at Thare Pati that same evening. I went down as quickly as possible towards the south, so shaken by jumping from stone to stone that I started making big detours so as to find turf under my feet. Reaching at one o'clock the cascade of our camp of the previous night, I saw the coolie trying to cheer up Topgi the Sherpa, who was sick. I too began to feel queer inside, though I had eaten nothing but Tilman's bread...! I am sure that sinking feeling was due to the fog through which we had come too fast. An hour's rest was indispensable while I shared eggs and rice-flakes with Topgi, who suffered from a splitting headache. Depressed and lonely, the coolie had so far eaten nothing.

By 2 p.m. we were climbing back to the main camp, negotiating once more the nine lateral ridges of that declivity. And there I had to laugh when Topgi danced with joy, his headache forgotten: he came upon a hen pheasant caught in the snare he had prepared on the previous day. By the time I had dragged myself up the long gully of erratic blocks below Thare Pati, I was dead tired; it was nearly 7 p.m. and never had I longed so much for the mug of tea which the sergeant brought to me some hundred yards below the camp.

After the pure snow-breeze of the heights, the pre-monsoon heat in Katmandu would be detestable and we walked back as slowly as possible. During one night we slept near a few cows in a clearing above Gul Phu. At sunset the shepherd performed a rite for the benefit of his beasts, killing a chicken over a sacred diagram drawn with pinches of flour. In the middle of the night, as I was trying to sleep in spite of dogs barking in a most exasperating way, that man began to yell the same word many times: "*Shooo - ya!*"

A leopard was prowling around and had just killed a goat belonging to a shepherd some 200 yards away—exactly where I had hesitated whether to camp or not. "Tilman never hesitates and always sticks to his first decision", Malla had told me some days before. On the previous evening I had remarked: "Shall I be like Tilman, a real leader, and remain in this clearing without changing my mind?" Malla did not care; in the end I moved on, I don't remember why. Had I been like Tilman, I might have seen the leopard!

The last camp was pitched on the north side of the Sheopuri ridge, on the Chiba Danda. Soon after sunrise, after a last look at the pure beauty of the lordly Himalayas, we went on through the mutilated woods and returned to the over-populated valley of Katmandu.

I could not time my stages since I stopped so much and so often to wait for a ray of sunlight in order to film.

The small mileage of the stages counts less than the steepness of the path, which very often looks like the dried-up course of a torrent. For coolies carrying loads of 100 or 120 lbs. it is probably easier to go straight down with small dancing steps: a path is thus made. Since there is no dynamite available to demolish rocky spurs, the track is often mad enough to make a Swiss gape with wonder. It is also possible that these Asiatics—men and women alike—are so strong that they do not see the necessity of a progressive or rational path, planned to save their efforts.

In Katmandu I was told it was 12 miles to Pati Bhaniyang, 10 miles to Gul Phu, 8 miles to Saone Mani, and 4 miles down to Malemchi village... all rather approximate.

These three weeks in the mountains cost me under 140 rupees—a little over 20 pounds: 2 coolies, only during the walking days, 54 rupees; 1 Sherpa guide, 7 days 35 rupees; eggs, milk, flour, butter 10 rupees; tips to dancers, soldiers, guide's family 40 rupees.

In have no hesitation in saying that the success of my tour, including the many interviews with villagers, was due to the intelligence and the charming ways of Lt. Sher Bahadur Malla.

OUR CLIMBS IN BOLIVIA

By Hans Ertl

Leader of the German 1952–3 Andes Expedition

ILLIMANI, *forty days of climbing and scientific work in the twenty thousand foot region of the Illimani massif.*

The Illimani with its 21,000 ft. stands out not only as a beacon of the Bolivian capital La Paz, but as one of the most beautiful and impressive groups of peaks in South America. Until recently its northern summit was one of the few major unsolved problems of the American continent. The south summit, hitherto known as the chief summit, had been climbed only five times altogether. The following is a brief summary of these ascents, based upon the records of the "Club Andino Boliviano".

In 1877 Pico dell'Indio, southern outpost of the Illimani, was climbed by Carlos Wiener and José Campo with three bearers. In 1898 on the 5th and 6th September, Sir Martin Conway crossed the Pico dell'Indio with his two guides, Maquignaz and Pellissier, and made the first ascent of the south summit of the Illimani, which had until recently been considered its highest point. On 26th and 27th May 1915 Adolf Schulze, Eugen Bengel, R. Dienst and E. Overlack made the second ascent of this summit. On this occasion the party started from a gold mine on the south-eastern spur of the mountain, whence they could reach the Wiener and Conway route. After two unsuccessful attempts by Albert Borsig and Fritz Kübler in 1929 and by Dr. Fritz and Pierro Ghiglione in 1938, the third ascent of the south peak was finally achieved, on this occasion from the west flank, by W. Kuhn, Dr. Fritz and R. Boettcher. This political climb, as it was called, was followed a few days later by the no less political ascent by the English railway engineer de la Motte, accompanied by the Bolivian Jesus Torres, who climbed in the tracks of their predecessors, and pulled down the German flag with its hated swastika, erected by the third party to make the ascent. Incidentally it was inaccurately stated that the three Germans had hoisted *only* a swastika flag; I have seen photographs showing what was then the German national flag flying on a pole next the flag of Bolivia. To keep clear of any political implications, we always hoisted only the flag of our host country Bolivia, when there was occasion to hoist a flag during our climbs in the Andes.

The fifth ascent of the mountain was made in 1946 by the Swiss Liggenstorfer and Pahud and the German Simon, all members of the "Club Andino Boliviano".

During April and May 1950 the Illimani experienced an unprecedented invasion of climbers with mountaineering and scientific ambitions, no less than six further ascents being reported during those six weeks.

I myself had perhaps inspired this series of ascents by my solitary climb of the south summit (21,160 ft.) on 3rd April. We had sent in our programme for the expedition to official quarters and to the "Club Andino Boliviano", and its publication somewhat stimulated the best Bolivian mountaineers to emulate us; from the base camp on the west side of the Illimani we had just one day's start on the best Bolivian party led by Douglas Moore, a highly patriotic Bolivian of British extraction. With track making and step cutting in bad weather we were losing our start, when my friend Gert Schröder was struck by a bad fall of stones. I was helping my bleeding friend down, when we were overtaken on the western shoulder; I declined the Bolivians' offer of assistance, not wishing to impede them in achieving their objective. When I had safely settled my friend at Camp I, the so-called "eagle's nest", I set out alone at 5 a. m. from that provisional camp at about 17,500 ft., in order at least to overtake the Bolivian party. Two hours later I reached the Bolivian camp at about 18,400 ft.; they were about sixty yards away, when I, still on an exposed ridge, passed them and their porters apparently fast asleep in their tents. Proceeding quite alone, I then succeeded in dealing with the most difficult passages, thanks to my twelve-pronged crampons, and at seven o'clock in the morning I reached the summit face at about 20,000 ft. Meanwhile the weather had got worse, and a severe snow-storm compelled me to dig out a bivouac shelter, where I had to remain until one o'clock. When the weather cleared, I attacked the face with fresh heart, and stood on the summit, 21,160 ft., at exactly half-past four in the afternoon. To a ski stick I had brought with me I attached an empty tin containing my visiting card with the date of the ascent. This was the first solitary ascent, the sixth altogether. On my way down the face, I saw far below the Bolivian party climbing towards me. A terrific yodel brought them to a halt, as they listened. They had preferred a more comfortable route by a curve of the glacier to my shorter continuous climb along the ridge, and they seemed to be horrified to see a solitary climber descending the summit face at a good speed. On my ridge I was soon about a rope's length from them. Without envy they offered friendly congratulations, while Señor Moore called me a "terrible man", because I had attacked the mountain alone; moreover with my crampons I came down the steepest slopes as though on a slalom *piste*. They also asked me whether I needed any provisions; I declined and we parted.

Their party then pitched a third camp, and did not make the summit until the following day. Two days later the Bolivian mountaineers Douglas Moore and

Guillermo Sanjinés handed me back my visiting card, recovered from the tin on the summit, amidst tumultuous applause from several excursionists who had wandered up to the base camp.

Despite the fact his head wound was only partly healed, our geologist and meteoroligist, Gert Schröder, also reached the south summit on 8th April, climbing the last 650 ft. alone, as his rope-mate stayed behind.

On 14th April I was particularly pleased to accompany a party of Bolivian soldiers and their Lieutenant Azero to the south summit and also to give them some photographs I took, a slight recognition of the exceptional assistance given us by soldiers and officers in pitching our camps and in transporting our equipment. It was indeed a memorable moment when Lieutenant Azero and his three gallant soldiers set foot on the summit—the first men to do so in the history of the Andino regiment, indeed of the Bolivian army—a summit which had hitherto been seen only as a badge on the tunics of Bolivian mountain troops, and when they hoisted their flag on a twenty-foot bamboo pole high above the lovely fields of their Bolivian homeland.

During the night of 27th to 28th April, despite an icy storm, my friend Gert Schröder and I reached Camp III at an altitude of 20,700 ft. on the top plateau of the Illimani, and went up the south summit again to take surveying measurements and ray recordings. Not until we had finished this task could we devote all our attention to the still unclimbed north summit.

A direct traverse from Camp III over the middle summit to the north summit was impraticable owing to the strange nature of the intervening ridge; its curiously corniced gendarmes had snow and ice outgrowths of almost Himalayan dimensions.

Despite continuous snowfalls during the first days of May, we firmly resolved on the evening of 5th to attack the north summit next day or finally to leave the Illimani. On the day before, bad weather had forced us to relinquish a climb, but we had safely deposited our skis, rucksacks and other impedimenta on the western shoulder of the Illimani at about 19,400 ft., since it was from that point we would descend to the immense glacier basin, which is enclosed on three sides by the north summit, the middle summit and the west shoulder of the mountain.

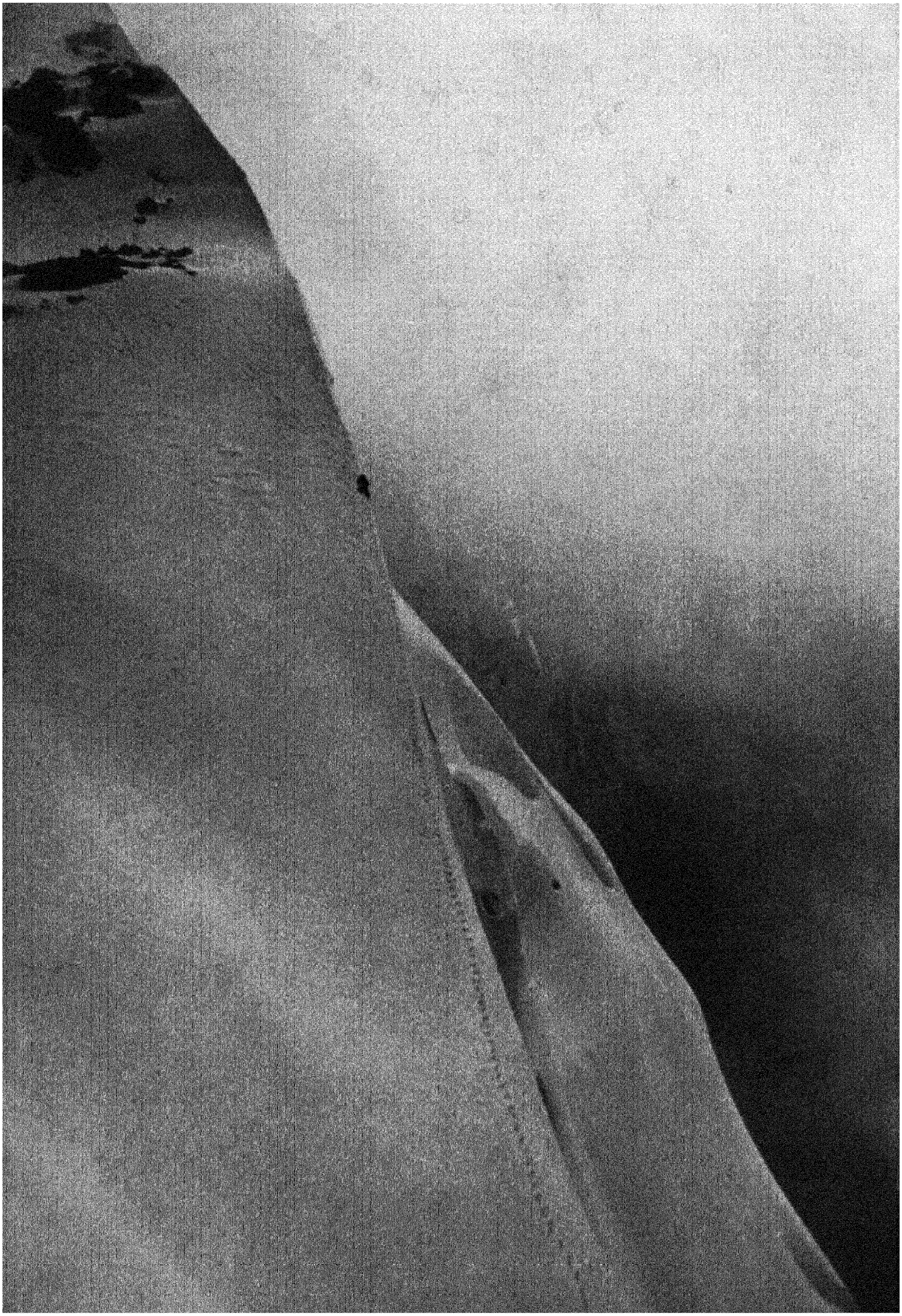
It was under a brilliantly starlit sky, a night clear and intensely cold such as usually succeeds a prolonged snowfall, when at about five in the morning of 6th May we left our camp at 18,400 ft. Only over the Altiplano and to the north-west, around the Ruaina Potosi, hung a few wisps of cloud. "They can't affect us", opined my meteorological friend, and so we stamped our way briskly through about eight inches of fresh snow to the sharp ridge above the camp. We had fitted our crampons in the tent, so as not to have to wrestle with them in the dark. All depends on rightly attaching these implements; they must not be fitted too tight, or one's toes will be fatally frostbitten, nor must they be too loose. We had applied special treatment to our feet for the climb; we had put sheets of slate, warmed at the primus stove, into our sleeping-bags, and then we had bandaged our calves in toilet paper up to the knee before drawing on our stockings of native Vicunna wool. Nevertheless we both had our toes frostbitten; at these altitudes a Bolivian winter is not to be trifled with.

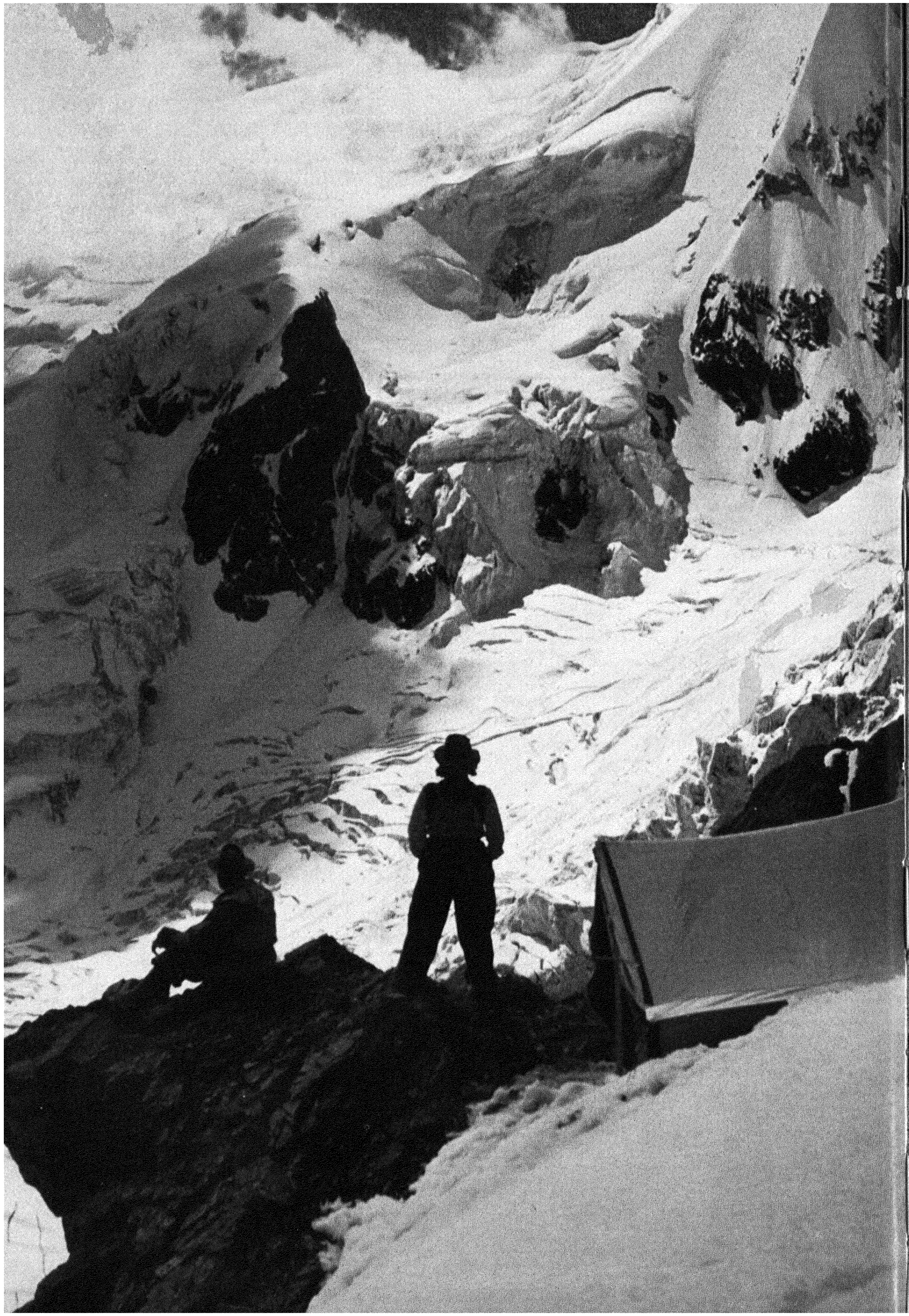
In an hour we had climbed a thousand feet on one of the sharpest ridges of the Illimani; we got along quickly because, as was our practice to save time, we were unroped, and moreover we had no gear to carry. We knew even the most tricky passages by night like the backs of our hands, having negotiated them many times up and down during the last few weeks. Our skis, rucksacks, ice-axes and pitons were slumbering peacefully under the fresh snow behind the pile of stones which, as a protection against the wind, we had constructed here two days earlier. As it was dark, and the snow liable to avalanche, we carried our skis down the long steep slope to the glacier, regretting the loss of 800 ft. of height in this unavoidable descent; there was indeed no better route to the north summit than this one we had been investigating for weeks. Sheltered by a crag on the edge of the glacier, we put skins on our skis and abandoned our crampons. Thus, in the early twilight, we set out fully equipped.

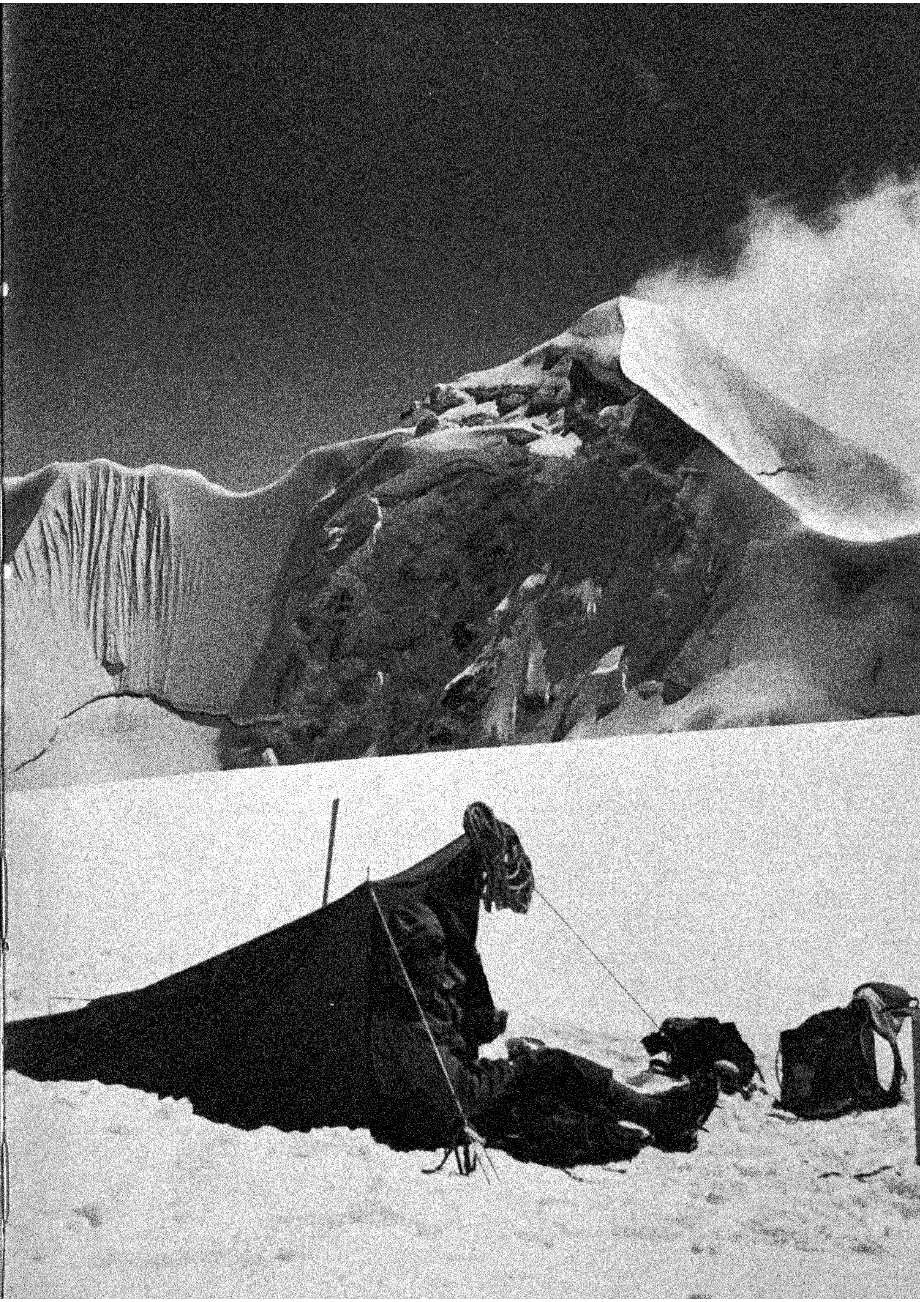
We roped up over this unfamiliar terrain to guard against a fall into a crevasse lightly covered by the new snow. Our skis proved a great advantage over the fresh snow, and after half an hour we reached the outcrops of the huge ice-avalanche which had thundered down from the south-west face of the north summit a fortnight before. Of such gigantic proportions was the ice-fall which had crashed into a narrow space that I could not but think of the disaster on Nanga Parbat in 1937, when a whole camp and its inmates were buried. Nearly the whole ice-face of the north summit had slipped and had filled even the deepest and broadest crevasses with blocks as high as houses. In the early daylight we wound our way through this wreckage—hurriedly and no longer observing the regular pauses for breath, for up towards the north summit the remains of the enormous avalanche were still menacingly poised, and the ice-falls on the south summit looked ominous.

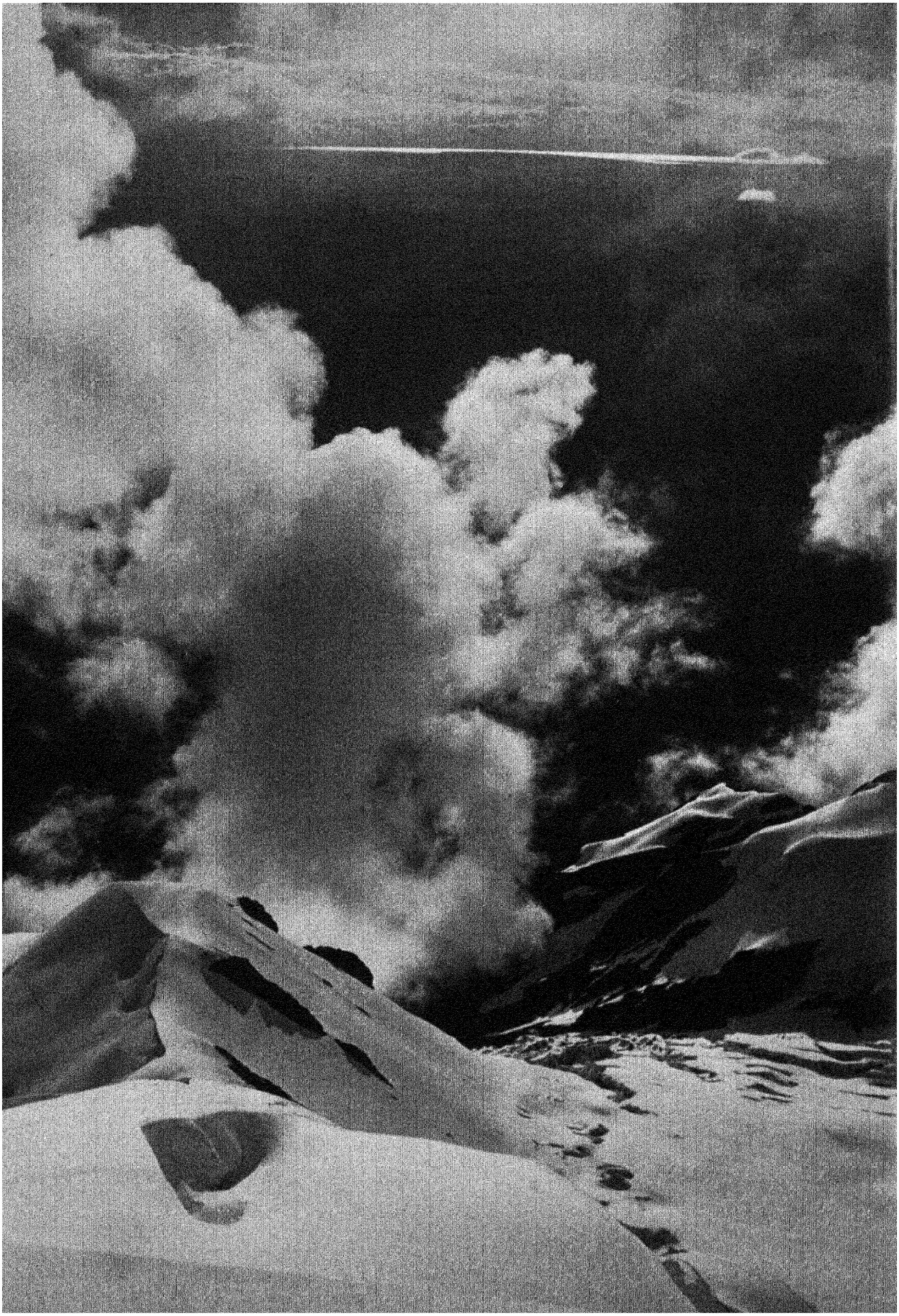
After half an hour at the double at 20,000 ft., we finally reached fairly safe ground, a terrace of the middle glacier. Absolutely winded, our lungs working like bellows, we took a short rest to recover our breath. The sun's first beams were catching a neighbouring peak that projected boldly from the western ridge of the Pico Morte. It was just over this immense ridge that the two German

Plate 37: Hans Ertl's "Ladder to Heaven" on Illimani (21,000 ft.).
Plate 38: Camp II on west rib of Illimani, towards the western face of the north peak.









mountaineers, Kühm and Gohrmann, had tried at the end of May 1943 to achieve that much prized objective, the north summit; theirs was not the prize, but a tragic end. They must have met their fate through a sudden storm, and it is awesome to think of their falling more than 3000 ft. to that chaos of ice from which we had just hurried. No resting place their grave, for avalanches of ice crash over it continuously.

In kick turns we made our tracks up the slopes which, broken by séracs, crevasses and snow-bridges, led up to the col between the middle and the north summits. We eased our way past unstable looking cornices on the ridge above; during the night a huge cornice fragment had broken off, and, starting a fresh snow-avalanche, had filled up a great cleft at what was for us a convenient spot. Cautiously availing ourselves of this natural bridge, we finally reached a suitable point just under the col at half-past ten, and there we left our skis. Though the sun shone warmly upon this sheltered spot, we both felt our feet frozen; my right foot especially had lost all sensation. So off came our boots, and our feet in the snow. We rubbed them until they looked red-hot and felt as if burning; then we bandaged them with fresh paper and put on new socks. Equipped with crampons I now made tracks, straight upwards because of the danger of avalanches, ploughing through powdered snow a yard deep. Again an avalanche-bridge helped us over the bergschrund. Yard by yard I worked my way up, gaining height with infinite slowness. At last we reached the col, and over wearying breakable crust we stamped up the last rope-lengths over a snowdrift at the start of the actual south ridge. This led in a bold curve direct to the summit—but it was seasoned with some grim looking places, suggesting many tricky problems.

An icy wind was blowing from the east, although far below us were the tropical primeval forests of the Yungas valleys. Our recent longings for warmth, flowers, bright birds and butterflies, palms and fruit trees, froze again under the blast. Behind oddly formed drifting snow we scooped out a little shelter, but even there the wind kept blowing out our Esbit stove; so we emptied a rucksack, and in its shelter brewed our coca-leaf tea. Then I attacked the first gendarme of the ridge, the beginning of our steep climb. Overhanging cornices on alternating sides of the ridge caused several lengths of the rope to get coated with knife-sharp snow. My friend was watching my start rather apprehensively; but my old slogan, "You must grasp the mountain like a girl at a dance to know what she's made of", seemed to reassure him. "Faint heart never won fair maiden", I went on as I wrestled my way up to the first length of rope—a ticklish business, for

Plate 39: North peak of Illimani from Camp III. Line of ascent follows the sharp snow-ridge bending off from the snow-col at the right.

Plate 40: View from the face of Illimani south peak towards Altiplano and Lake Titicaca.

there was no possibility of getting a firm position. Most of the ridge and the declivities to left and right were covered with a thin wind-crust, under which lay loose and dangerous powder-snow of uncertain depth. For the security of the man behind me, I had to build whole platforms into the ridge, and meanwhile I could only plunge the ice-axe into the loose snow and belay the rope round it as a moral support. The best assurance I could think of was our mutual understanding—"If I crash, Gert, you hurl yourself down the other side of the ridge; the rope will hold and so will our ribs."

After propounding this encouraging expedient, I clambered farther up the ridge. I bore left around the first big cornice, and now the rope was being payed out in a constant and regular rhythm. I kept hacking and digging out a position for myself and my successor; step by step, something like a rope dancer, Gert balanced in my tracks. Yard by yard I carefully drew in the rope. There followed a pause for breath; then we hurried on again, scrambling upward, labouring hard. The steps kept breaking away under my friend's feet; what just held with me might give on the second strain, and it was with no pleasant feelings that we watched the lumps of hard snow vanish into the depths on one side or the other.

We could not afford to make the slightest error. The least inattention could mean a sudden end. We went on; our grips and movements were almost automatic. To my freezing friend below the running out of the rope seemed interminable, while for me the 40 yards and its ensuing rest were always over far too soon. A second cornice led me to traverse by the south-west face; but I took the last cornice by a frontal attack. We were carrying our ice-pitons and hammers to no purpose, for there was nowhere for a piton to hold. Often we passed the camera to one another to make a record of this difficult climb; but unfortunately the trickier passages escaped us, as we were fully occupied and neither wanted to risk a fall for the sake of a photograph.

The sun was ominously near the horizon when at last I climbed the final rope-length to the summit and the climb came to an abrupt end as I faced an awesome precipice. The ridges to north and west are quite unapproachable; where they are not overhanging and covered with mushrooms of snow, they look like the clipped manes of a horse falling now to right and now to left.

We had left our camp tent at five in the morning; it was ten minutes to five in the evening when we shook hands on the summit. We gave resounding shouts of triumph, calling down to the base camp and out to the glorious world beyond. Were we heard? Far away gleamed the roofs of La Paz; were we being watched from there? Unbelievably beautiful, towards the setting sun, lay Lake Titicaca, while the eye passed over the endless tablelands of Altiplano, South America's Tibet, to the Sajama and thence to the whole gigantic chain of the Cordillera Real.

Indescribable were our feelings at having achieved a goal that for so many mountaineers had remained but a longing, a dream.

We hoisted the Bolivian flag on a ski stick and as it fluttered out in the evening breeze our thoughts sped to friends at home. In our rucksack we had brought our thermometer for testing the boiling-point at that height, and when we afterwards compared our estimates with the table of altitudes at the San Calixto station at La Paz, we found that our survey from the south summit, a few days earlier, was confirmed. The north summit at 21,260 ft. (6480 m.) is at least 30 m. higher than the south summit, formerly considered to be the highest point.

In order not to be benighted, we had to hurry and tackle the descent. At successive rope intervals we secured our climb down the dangerous slopes. Just as the daylight was failing, we reached our skis under the col, and after a bold descent in the twilight, picking our way past crevasses, a race with the darkening night, we had to rope up again in order to feel our way cautiously through the blocks of the ice-avalanche. If the moon had only appeared, that would have been a great advantage, but we could not possibly wait until it came into view at one o'clock. So we stumbled on, dead weary and worn out, until at last we reached the ridge under the shelter of which we had put on our skis in the morning.

There was still the laborious climb up the steep slope to the western shoulder of the Illimani, and the run down to the camp beyond it. Our limbs felt like lead, but all troubles come to an end, and we skied swiftly down through the dark night. Far away lay the lights of La Paz, and moving headlights of cars mingling with the stationary red of advertising signs; but just below us in the black depths a tiny solitary light shone quietly. There our friends of the base camp, a home from home during the weeks on the Illimani, were expecting us, with everything ready for our reception—warm food, tea, beer, good camp-beds and soft downy sleeping-bags. Thus we made our way down the last dangerous part of the ridge to Camp II; but the base camp was still more than 3000 ft. below it. At ten o'clock we sat before our Camp II tent dead weary, and with numbed fingers we prized off the hard-frozen straps of our crampons. It was seventeen hours since we had left this camp, hours which, with about ninety minutes of rest, comprised, despite all the hardship and some danger, the greatest experiences of my life.

The first ascent of the Illimani's north summit was a worthy climax to the preliminary object of the German expedition to the Bolivian Andes; in this connection I feel it a privilege to express my sincere sense of gratitude to my friends for their active collaboration in scientific research and the published accounts, as well as in the climbing itself. It was no small task for Frau Milli Bau to manipulate not only the typewriter and the radio, but also the cooking utensils and the ice-axe, whether at the base camp or at Camp II at over 18,000 ft.

As geologist and meteorologist, my rope-mate Gert Schröder secured valuable scientific results. Apart from his daily meteorological records, the investigations at Camp II, with a special contrivance weighing nearly 70 lbs. for measuring atmospheric electricity, were particularly successful and they were the first to be conducted at such an altitude. By a reading of the curves described by this self-recording apparatus it was possible to deduce the effect on atmospheric electrical conditions of changes in the weather and a certain reaction of the human organism to the intensity of atmospheric electricity. Such physiological observations at a great altitude were confirmed in the comparison of observations made upon ourselves, and they provided most valuable hypotheses for arriving at the basic causes of "Soroche"—or "Puna", as the dread South American high-altitude sickness is called. It should be added that, apart from such electrical influences, the presence of metals in the earth, the ionisation of the air, radioactivity and intense ultra-violet radiation play their part.

The value of the achievement of Dr. Walter Forster, the biologist, will be known only after the examination of his collection of beetles and butterflies. With butterfly net and alpenstock, he covered the field between the base camp and the moraines of the Illimani Glacier. The German Alpine Club gave recognition to his work by a personal contribution of 1000 DM. (about £ 80).

April, May and June are deemed the best season for mountaineering in the Cordillera Real. Polar cold condemns the winter months of July and August in South America, while in September and October the feared *nevados* (snow-storms) often rage quite unexpectedly, as we were ourselves to experience; these precede the rainy season and, like the monsoon in India and the Himalaya, make all major ascents difficult, often impossible.

The first part of our expedition's mountaineering programme was concluded on 5th June 1950 with the third ascent of the Kondoriri, the Bolivian Matterhorn. On this occasion my companion was Alfons Hundhammer, who had joined our expedition later. This climb nearly turned into a race between ourselves and Bolivians. We failed to secure the second ascent of this beautiful peak, for the Bolivians got to the top first.

The "Club Andino Boliviano" had invited us to a joint attempt, and a climbing party of ten men set out. A three-hour walk with transport to Mina Union was followed by a night march through high remote valleys, where the club's guide, "the local expert", had landed us after more than three additional hours of deviations; at two in the morning we reached our camp-site on the truly fairylike banks of the Kondoriri Lake.

At half-past nine on a glorious morning we set forth, the Bolivian group consisting of Douglas Moore, Guillermo Sanjines Rojas, Gustavo Moeller (who was killed on Aconcagua in December of the same year) and Dr. Fritz, our own group consisting of Gert Schröder, Alfons Hundhammer and myself.

Scrambling up to a col with heavy expeditionary baggage and our skiing equipment, over steep slopes of scree deposit, was no simple matter; nevertheless we kept up with the Bolivians, although their sole baggage consisted of some dried plums in their trouser pockets. It was not until about two in the afternoon that we reached the Kondoriri Glacier, our starting point for the climb of the south ridge. This was far too late, and as I would not in any circumstances depart from my principles, I decided to postpone the climb, the more readily because my Illimani companion, Gert Schröder, was not very well. Equipment and apparatus were stowed among the rocks at the edge of the glacier, and Hundhammer and I accompanied the Bolivians on skis to the start of their climb. The sudden shout of our friend Schröder, who had reached the rocks on his way back, called our attention to a remarkable sight. Nine condors were attacking our friend in regular successive dives. Gert was wielding his ice-axe wildly, until one of the attackers was struck by a stone and the others were cowed and desisted. I was too far up the glacier to film this unique incident.

It was delightful running down the broad slopes of névé from the upper Kondoriri Glacier to our depot in the rocks. From there we watched the Bolivians for a long time, as they worked their way up the south ridge. They progressed but slowly; in the race against swiftly advancing night they must be losers. I had warned them often, but in vain, for the opportunity of taking revenge on our success on the Illimani was too tempting for them to forgo.

On the way down to the lake Camp I managed to shoot three viscechas, those swift footed "hare-cats" of the Cordillera; with this tasty roast we ended the day.

The Bolivians did not get back until three in the morning, and they were glad of the hot tea and hot meal awaiting them. I congratulated them on their victory, whilst animadverting upon the fact that such a climb at altitudes of 20,000 ft., without all-weather clothing, spare underclothing, bivouac materials, emergency rations, torches, medicines, etc., and at an absurd hour, having regard to the exhausting effects of tropical heat, were irresponsible as judged by European or international standards. One does not always have luck with the weather; the tragic disaster on Aconcagua which befel almost the same party of Bolivian mountaineers six months later, was, according to the evidence I had, to be ascribed only to the application of wholly mistaken principles.

The Bolivians left us during the morning, and Gert Schröder, who was suffering from angina, went with them. The following morning, Hundhammer and I set off methodically at two o'clock, and eight hours later, despite our supplementary load of camera and film apparatus, aneroid and thermometer, we stood on the summit of the Kondoriri (19,420 ft.).

The view over the whole circle of Cordillera peaks was of an almost unreal beauty with the sea of mist veiling the virgin forests to the east. The descent of the ridge, in parts sharp as a knife, called for the utmost attention, and sometimes we were positively astride it. To shorten the last third of our descent, I picked out a couloir running straight down to the Kondoriri Glacier. My rope-mate, secured by me, descended into the gully and was soon out of sight. Suddenly I felt a fearful pull on the rope, which hurled me against a rock face some 10 ft. lower down, to which I managed to anchor myself and hold on. Hundhammer, who was using crampons for the first time in his mountaineering experience, and to whom I had the day before explained the elementary principle of using these prongs, had fallen into the characteristic beginner's error of leaning into the slope as it got steeper, instead of getting the body's centre of gravity well away from it, and getting a firm grip of its surface with every prong. Anyway, we survived to see another day, and we were back at the camp within five hours of starting down. Next day, with two Indio porters whom the Bolivians had sent us, we wandered through a wonderful high valley, with herds of llamas and slopes covered with wild blue lupins, to the Mina Union, where we were heartily welcomed and royally entertained by a Hungarian mining engineer and his Dutch partner.

As late as June we had carried out this climb according to plan, with transport and porters to help us at least to the base camp, and in the most perfect weather. The ensuing Bolivian winter was devoted to research work in a cave near Sorata, in the Junghas woods round Chalama, and to exploratory excursions into the tropical depths.

Under indescribable difficulties, particularly as regards money, I finally succeeded, despite weather conditions in September and October 1950, in attacking the second part of our mountaineering programme. We spent nearly two months in the country comprising the Illampu (or Sorata) Hancouma massif, an area of more than 1500 square miles, within which Hundhammer and I, without porters or mules, by our own unaided efforts carried over two hundredweight of baggage across four passes of over 16,000 ft. in relays from camp to camp. During this time we climbed four peaks of over 16,000 ft. and one over 20,000 ft., this being the first ascent of the north-western summit of Hancouma (20,930 ft.) over the very difficult north-west ridge.

Primarily these were mainly reconnoitring expeditions, since at the time we still lacked the documentary record of the 1928 German Expedition to the Andes, more especially Dr. Troll's marvellous map of the territory, which is still regarded as one of the best maps of Bolivia. Moreover, we were reserving really major expeditions for the months of April and May 1951. Our work was made more difficult by the fact that this group of mountains on their eastern flank terminates in nearly tropical virgin forest. Already during the dry months, and daily when the rains start, the vapours from the forests condense to clouds over the narrow valley, and eventually burst in terrible storms of snow and hail upon the mountain ridges. Only a few hours, mainly at night, are available for climbing; the danger of being surprised by bad weather on an exposed ridge is very great at this season, especially on long and difficult climbs of the 20,000 ft. category.

As the superstitious aborigines had prophesied, the gods of the Incas seemed to have set everything for our destruction. Not one Indio was prepared to undertake portering work for us at this season, while the "enlightened" demanded such sums as we could not possibly have afforded.

"Hancouma"—the name means "white water" in the Aymara language of the South American Indians—"will spill you away". Such was the warning of an old Indio whom we surprised in a ritual offering at a pile of sacrificial stones on the Abra tel Tipuani, a pass of 16,000 ft. When, in this "Castillano rich in flowers", we argued that since Illimani we had been favoured by his gods, and that our Bavarian mountain gods were not to be despised, he ejaculated blasphemous curses at us through his black teeth in which the pleasantest were words such as "sh.... Gringo" and "merda".

To anticipate the result, Hancouma did not sweep us away with his white waters or his snow-storms and avalanches; but he dealt with us so thoroughly that we shall remember that testing time always. First, with indescribable labour we dragged our equipment by relays from Hancuma, the little village on the north-west flank of the Illampu, to a pass at 16,800 ft., which lies on the western side of the Illampu-Pico Schulze group, whence one can descend direct to Gorata. Then by way of reconnaissance we climbed two unnamed summits on the Pico Schulze Ridge, of 18,760 and 17,400 ft. respectively (according to Professor Troll's maps for the "Alpenverein"), and for the first time we could make out precisely the whole route taken on the first ascent of the Illampu by the 1928 expedition. Exposed ice, a poisonous blue on the ill-famed ice-face leading up to the west col of the Illampu, deterred us from using the same route. We diverged farther along the western flank of the massif over crumbling slopes of moraine, under menacing cliff-glacier and over smooth polished rock, until we reached the huge glacier basin between the Illampu and the Hancouma, which from Sorata had always been the main objective of my observations.

In ever-shortening relays we got our hundredweights over the ice-terraces of Sorata Glacier 7. On its left lateral moraine, at the foot of a fortress-like ridge of rock, we sought a place for a camp. On the way there, alone and a good way ahead—for the glacier being generally open it was unnecessary to rope—in the twilight I suddenly broke through a superficially frozen water-hole of indefinite depth with the whole of my hundredweight load. Never before, even when falling off immense floating icebergs in Greenland, had I been so near to drowning, and that in unimpressive manner at less than 17,000 ft. My companion was far behind, out of earshot; with my last strength I just managed to disengage my pack, and with my ice-axe, fortunately hanging by a strap from my wrist, and my twelve-pronged crampons, to scramble up the steep side of the hole, after which I fished out my goods. When Alfons came round a sérac, he saw a man dancing stark naked on a rubber mattress. He gave me his training suit, and thereupon we transported my baggage, now frozen hard, up along a moraine to an ideal site for a camp. The ice-water had penetrated to the deepest recesses of my photographic material. Application of petroleum got the apparatus to work again, more or less, but the films I had taken were damaged.

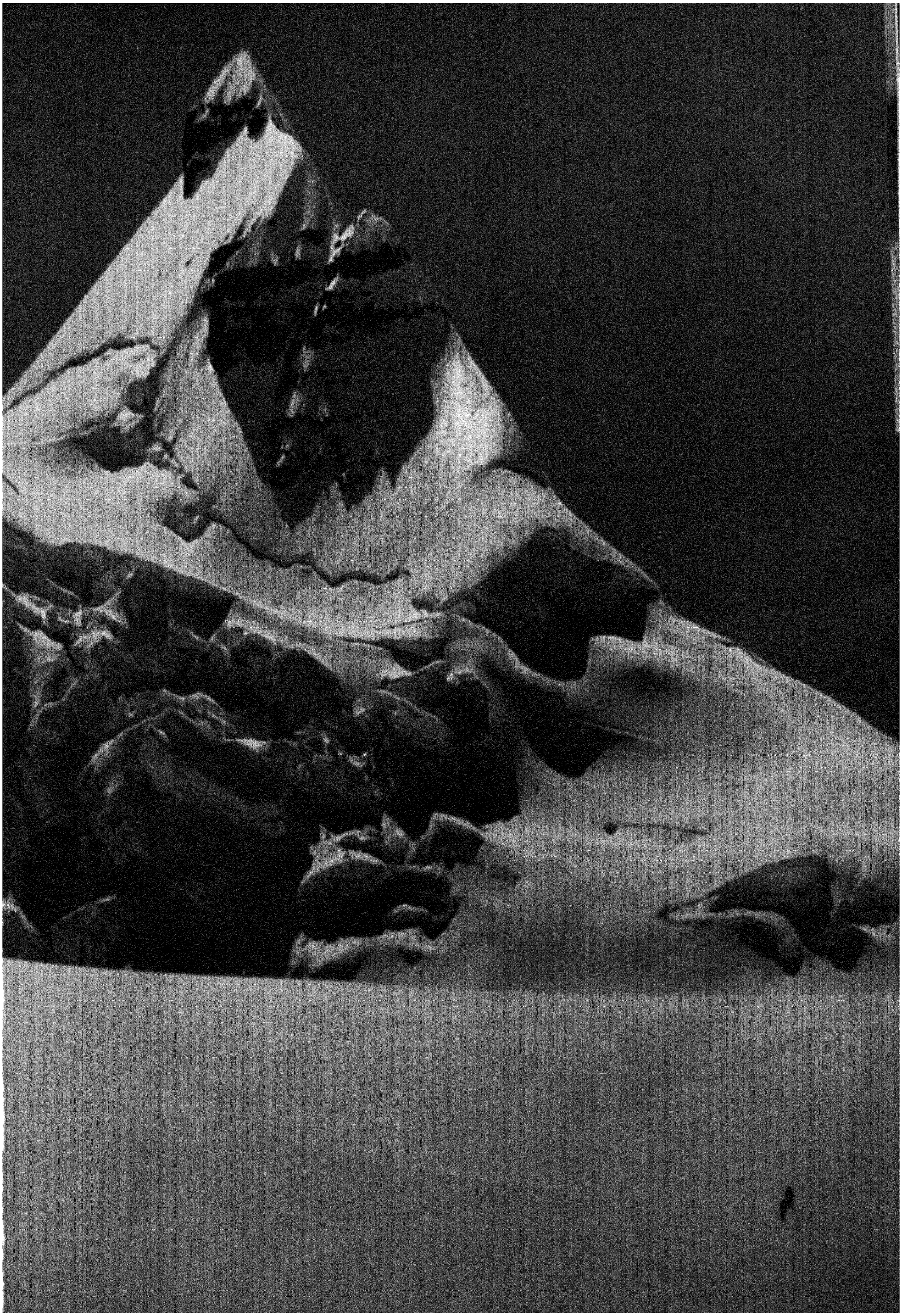
We took a day off for rest and drying, and then reconnoitred the southern flank of the Illampu. We hoped to succeed in reaching the west col from the upper Sorata Glacier 7, which is directly fed by the ice-masses on this side of the mountain.

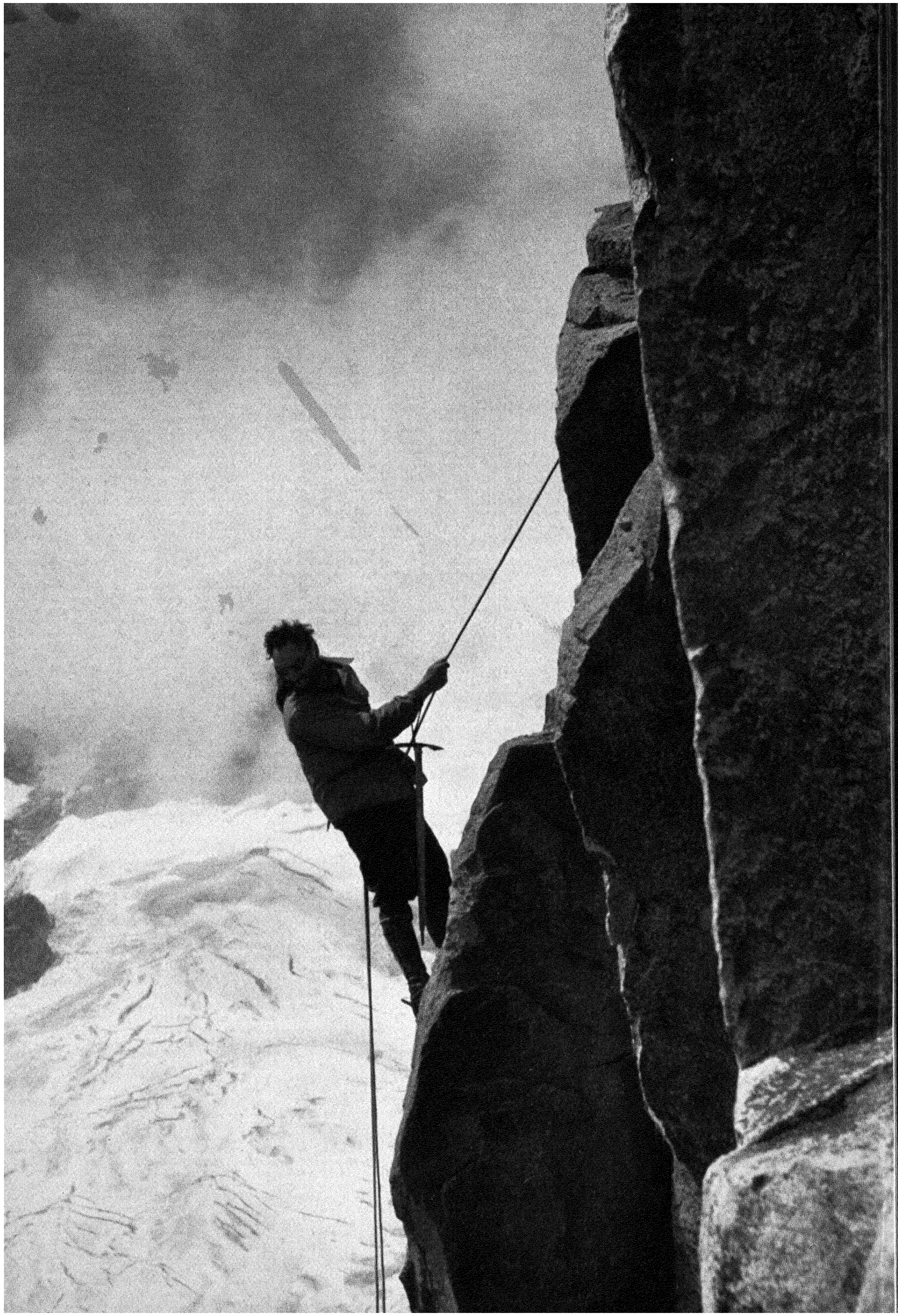
Then on the Sunday night of 24th September 1950, almost the whole of the ice-face we had selected for climbing broke away. The full moon gave us a good view of the infernal collapse, and we thanked the Creator who had spared us from starting two hours earlier.

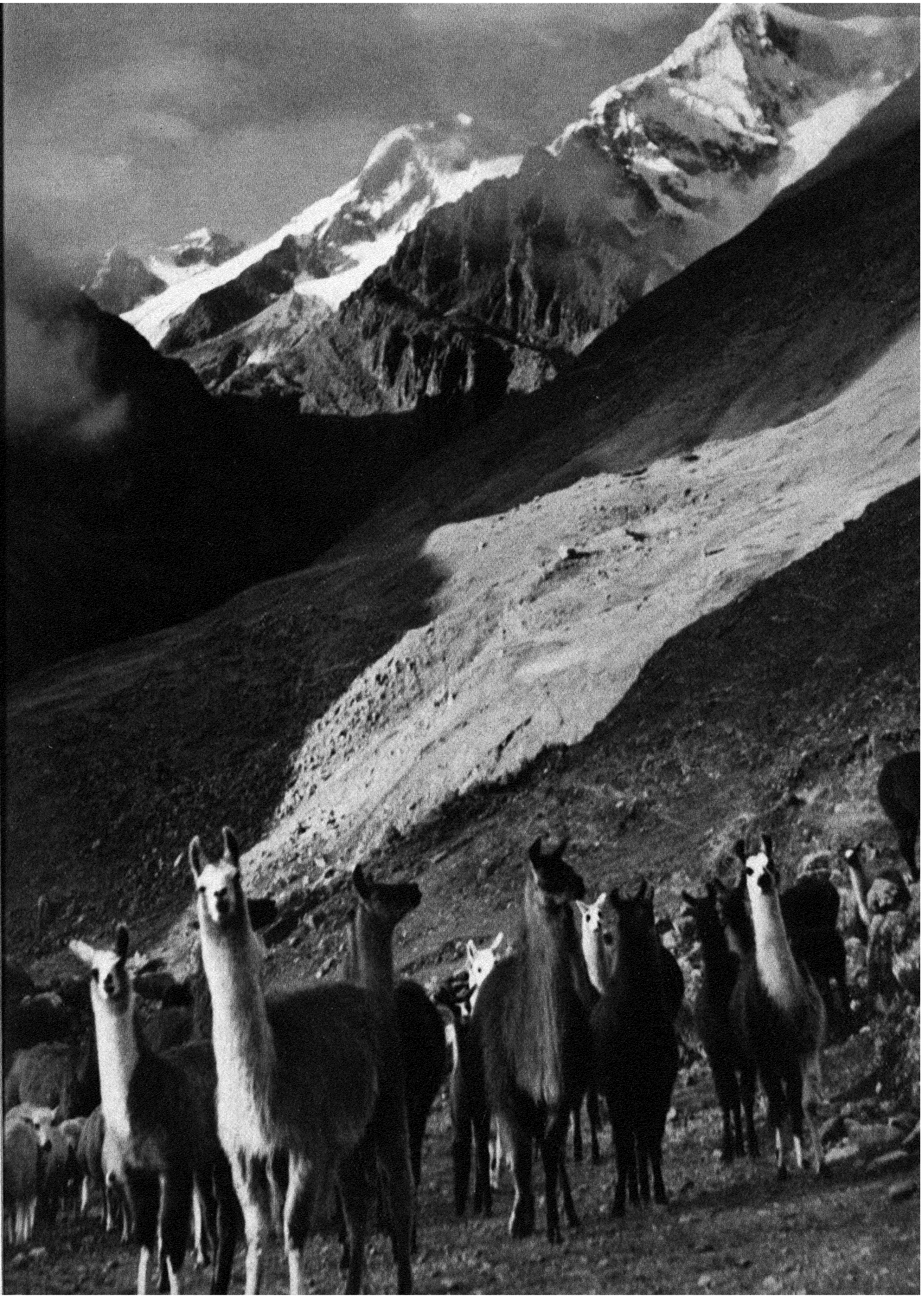
Turning our backs at once upon this chaos of ice at the foot of the Illampu, we made straight for the Hancouma. In the grey of dawn, with most tricky climbing, we were making our way over the incredibly rent Sorata Glacier 8. The first light of day still found us hard at work upon the chaotic ice-segments with which this mountain too protects itself. At last we stood at the foot of the north-west ridge which, apart from some rocky prominences, leads in an ideal line up to the crowning summit of the Hancouma (21,090 ft.), the highest mountain of this group. By a steep climb amongst punishing sérac-like ice we circumvented the first steep upward curve of the ridge on its west side, and after heavy step-cutting we at last reached that marked crack in the north-west ridge which, after a moderate rock slope, peters out into the névé ridge of the Hancouma.

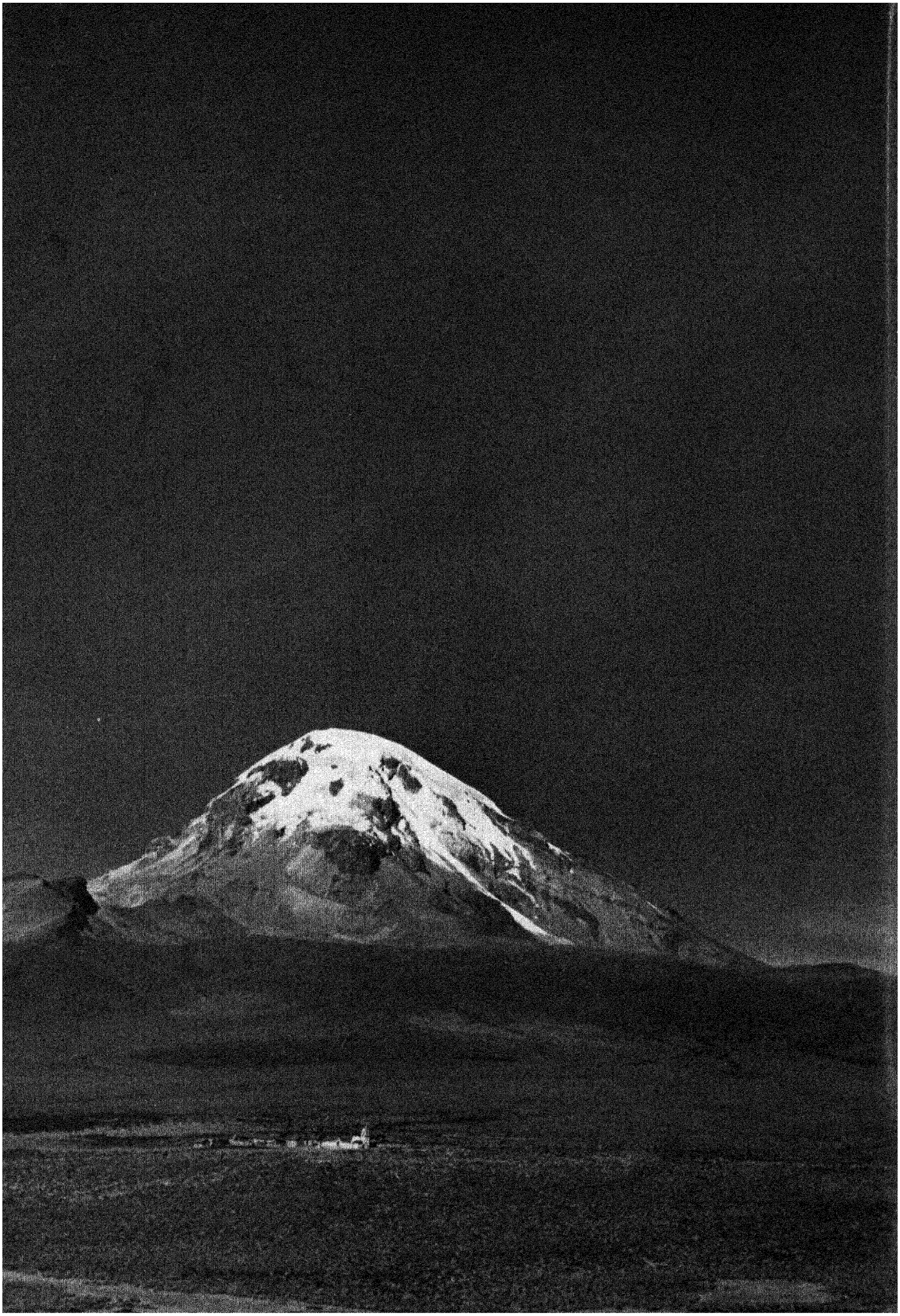
My friend was sitting comfortably in the warm sun behind a block of solid rock wedged into the crack, whence he secured my farther advance up a channel of partially iced rocks. The stone was all rather friable, imperfectly compacted by a thin coating of ice. At the trickiest point, a section that was iced and almost vertical, a boulder weighing about thirty pounds, wedged in ice, whose security I was testing for a handhold, came loose. I could not hold it without slipping myself. "Alfons, look out" I shouted, as the boulder bounded down through my straddled legs. I was breathing a sigh of relief, since my friend was not in its

Plate 41: Kondoriri (19,420 ft.). Route of ascent following right-hand ridge.
Plate 42: Abseil on the Pico Schulze Ridge.









line of descent, when at the last moment it bounded off the rock in the crack, and from an oblique angle struck my friend full in the face. A yell, and my rope-mate swayed and staggered with blood streaming from his face. Would he loose consciousness? For me, clinging without any secure hold to the trickiest position, it was a question of life and death. Bleeding profusely and fighting against the tendency to faint, Alfons was clinging to the rock, as I could see over my left shoulder. "Hold on like grim death", I shouted; "another fifteen feet and I'll have a firm position", I added to reassure him. "I'll manage it", came to me weakly from below; and he did. Without security, I clambered upwards. It was after not fifteen or even thirty feet, but when I had climbed half a length of rope that I came to the top of that rock. About fifteen minutes afterwards my friend was sitting by me on an excellent platform, still groggy but safe. His toughness and resolute determination had overcome the first shock to his system; after applying an emergency bandage, which wholly covered one eye, we resumed our climb. Looming over our rear was the marvellously bold outline of the summit pyramid of the Illampu.

It was fifteen hours since we had left camp; now I secured my friend over the last stretch, a distance of one rope, and in the light of the setting sun we reached the north-west summit of the Hancouma (20,970 ft.). The view over to Lake Titicaca was mysteriously beautiful; through a break in the cloud-layer below we looked, as from a plane, down upon the broad expanse of water, silvery in the light it reflected, save for the black outlines of the Sun Island and the Moon Island, the sacred places of the Incas. Because of my friend's wound, and as night was approaching, we abandoned the farther climb to the main summit. Hour after hour we stamped our way down in the deceptive moonlight through exhausting crust and over dangerous snow-bridges. There seemed to be no end to the vast Hancouma Glacier; there were always new difficulties to be overcome. In the twilight of a new day we traversed obliquely the house-high terraces by our moraine island. Utterly weary and famished, we dropped into the short grass by our tent, neither of us uttering a word, for our hearts were too full of the experiences of recent hours and also of the great happiness of having achieved a path that none had trod before.

Back in camp, in air free of bacteria, eating roast ciscacha, my friend quickly recovered from his loss of blood and all the trials of a twenty-two hours expedition in Bolivia's Cordillera Reale.

Storms and blizzards heralded the start of the rainy season. Proceeding under a burning sun, rendered more oppressive by the mist, over ice-galleries covered

Plate 43: Llamas, with Pico Norte (19,160 ft.) and Pico Laramcota.
Plate 44: Sajama (21,425 ft.), the highest summit in Bolivia.

in deep snow, unroped over smooth rock, through waterfalls, over steep slopes thick with prickly plants and dripping forest, we got back with most of our baggage to our pleasant quarters in the Casa Guenther at Sorata.

Once more during that year we defied the weather to achieve a 19,000-ft. peak. In the course of reconnoitring on the eastern side of the Illampu we made the first ascent of its due eastern neighbour of the Pico Norte (19,160 ft.); we christened it Pic Laramcota, after the lake of that name at its base.

Thus the report of our expedition for the year 1950 closes with three 20,000-ft. ascents to our credit, some of them climbed more than once, and five of over 16,000 ft., including in all five first ascents.

ILLAMPU *(20,830 ft.) : Second ascent on 10th to 12th May, 1951*

The last two months of 1950 and January 1951 found us in the heart of South America, in the green hell of the Chaco Boreal. By virtue of a confidential commission from the Bolivian Government we were traversing extensive untracked primeval forest where, apart from valuable zoological, anthropological and geographical results, we discovered new and extraordinarily rich deposits of iron ore. This exploratory research is the more noteworthy, since it was carried out by a party, hitherto accustomed rather to work above the snow-line, under completely new, extraordinarily hard tropical conditions, and that too during the rainy season.

The four members of our expedition, with the assistance of four soldiers, had to hack a way with hatchets through more than 75 miles of virgin forest. Since much of our equipment was unserviceable in the continuous rain, we had to make do with primitive makeshifts, and it may suffice to mention that the whole 75 miles through virgin forest and over some hills were surveyed by means of an eighty-foot long piece of climbing rope. Incidentally, we were driven almost mad by mosquitoes and other flies, and had several adventures with snakes, while our party was weakened by dysentry and hunger, and I had to shoot down monkeys as well as palm fruits from the trees to get our party to the objective with the last remains of our strength.

The President's personal plane had been placed at our disposal for covering the great distance between the capital La Paz and the starting point of our exploratory work.

On our return to Sorata we were painfully conscious, to the very marrow of our bones, that this virgin forest work had not exactly conditioned our systems for an immediate attack upon such a mountain as the Illampu. Even here, at an altitude of under 9000 ft., we found ourselves panting like old cart horses, as we went up the few steps to our quarters. We had to embark on systematic training, and to eat a lot of liver in order to restore the number of our corpuscles. It was not until the end of April that we were fit again.

Situated in the northern part of the Cordillera Real, the Illampu is certainly the most imposing of Bolivia's peaks of over 20,000 ft. Its flanks rise with extraordinary abruptness from the depths, so that any approach constitutes a serious and difficult problem. Its isolated position renders the mountain liable to any sort of bad weather, even at the best season of the year; to succeed, an Illampu expedition requires conscientious and tedious preparation.

After preliminary attempts and preparations lasting several weeks, the mountain was first climbed in June 1928 by Hein, Pfann, Hoertnage and Horeschovsky, all members of the German Andes Expedition of that year. In the intervening twenty-tree years the mountain remained untouched.

During 1950, in the course of our reconnaissance of the Illampu-Hancouma massif, we had secured from all angles an insight into the dangerous secrets of this mountain giant, so that we set out from Sorata on 1st May, 1951, with a clear conscience and confident of our objective.

On this occasion also the little hamlet Hancuma, 13,000 ft. high on the north-east flank of the mountain, was the starting point for our assault; we reached it after a harrowing lorry drive over a disused track to some mines.

With the help of three Indio bearers we saved time and energy, reaching the Rincon del Illampu in a few hours, where we set up our tent by a small waterfall. Barefooted, our bearers refused to stay with us because of the fresh snow, whilst promising to come back if the weather improved. On 3rd May the snowfall was quite extraordinary, and the large tracks of scree above, which we had to traverse to reach the Illampu Glacier, were completely iced over. Farther to the left, ice-avalanches were breaking off continuously from the snout of the Illampu Glacier, thundering down the rock face which was worn smooth. In the late afternoon, as the weather cleared, a broad expanse of valley below us came into view, and there we saw a whole herd of *venados*, Andes deer. On the morning of 4th May, lured by the fine weather, two porters at any rate came up despite the new snow. With their help, working in relays until 6th May, we established the real base camp at 16,740 ft., on the left lateral moraine of the Illampu Glacier. Many tricky mounts and descents were indeed required, as well as traverses over rocks iced over again with melted snow-water, before the last load was landed at the camp, when we paid off our porters and remained alone.

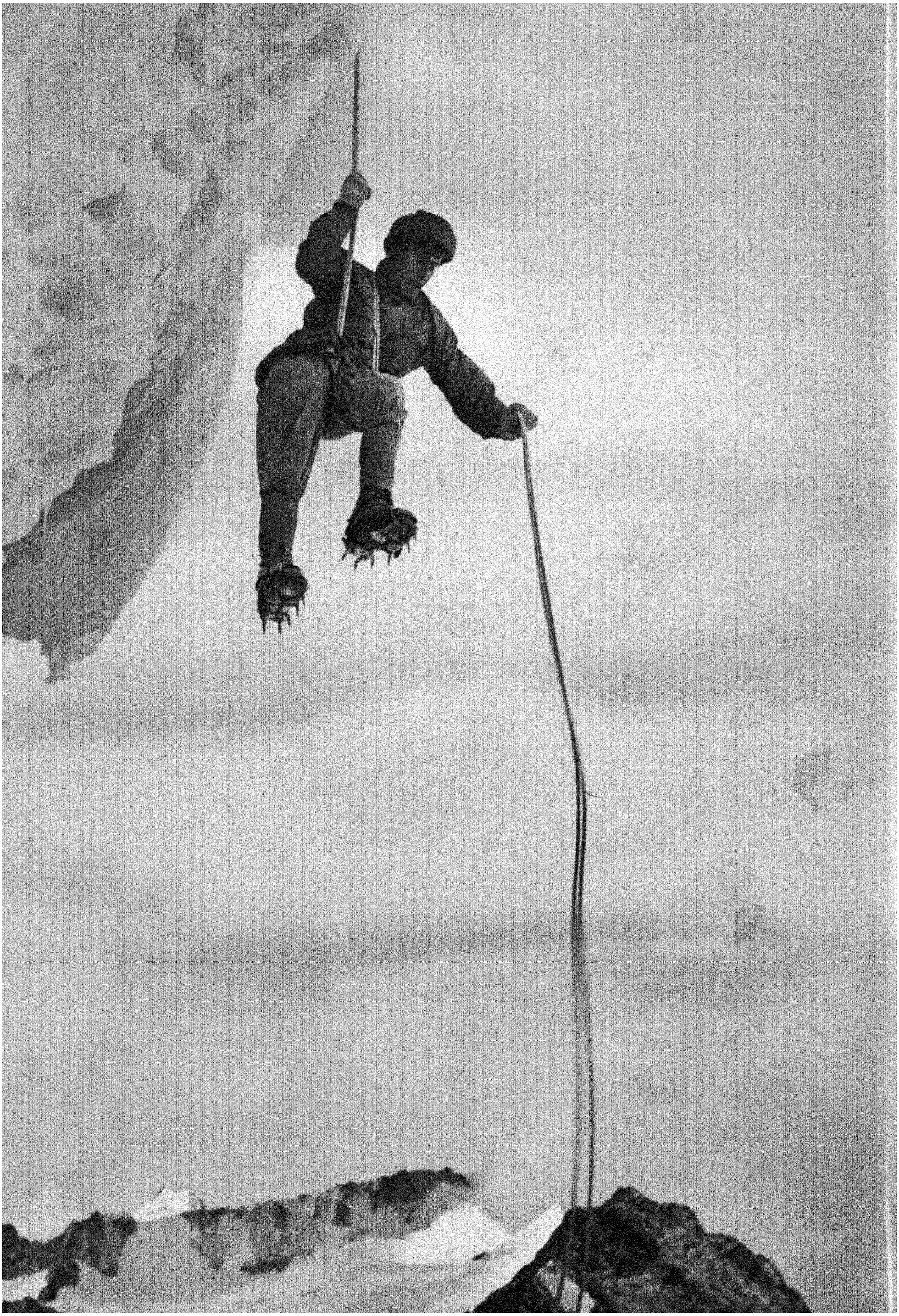
Although the weather was good, I prescribed the 7th May for rest and observation; it was not until four o'clock on the morning of the 8th that we first set out straight for the Illampu. First we took the route that was familiar from the previous year, climbing over the back of the snowed up left lateral moraine, and then over the fairly broken glacier, which flows like a waterfall, pressed in between the Illampu and the Pico Schulze. It was laborious work making our way up, knee deep in fresh snow. After a short rest we placed our crampons, ice-pitons, spare rope and provisions at the foot of the great ice-face, which rises to the west col in a single slight and represents the key to the climb, and returned to the moraine camp. Next day we started off again at 4 a. m. In the tracks of the preceeding day we reached our depot at the foot of the face as early as seven o'clock. With a slope of about 55 degrees at the steepest part, this ice declivity sweeps up to the col, 1600 ft. above, and is only twice cut by crevasses.

At first we rose quickly over a curve formed by an avalanche; but then we came to patches of bare ice, fragments of which splintered off at every blow or step. Below about an inch of polished ice was a layer of finely granulated loose snow, which ran through our crampon spikes like meal; under that was a hard layer of ice, dark green and polished smooth. This constituted a dangerous surface, on which we could not rely on our twelve crampon points alone; we therefore drove in our long ice-pitons, which bit into the under-layer with marvellous ease and were withdrawn with one pull. Since however such moral security is no reliable basis in this kind of ascent, I found it necessary to clear the surface and cut steps in the firmer under-layer. By the time we had eventually mastered the face in three day's labour, I had cut eight hundred steps; the effort needed for this can be appreciated only by a man who has done this work at nearly 20,000 ft.

We progressed with infinite slowness, constantly threatenend by falling pieces of rock and ice, which were embedded up on the Illampu ridge or were detached from the ridge that leads to the Pico Schulze. On Wednesday, 10th May, we were able at last to tackle the top third of the face, surrounded by steep rock on the right. We had only some 400 ft. more to climb, but that day too we returned to the moraine camp, because it was too late. At the most difficult parts instead of ice-pitons we had inserted wooden posts 30 inches long, and they proved excellent; by our new Perlon ropes we let ourselves down as easily as going by lift. We could just leave them hanging on the face, as this material always gives a good grip, and does not get iced even in extreme cold. On 11th May we left our camp as early as three o'clock, and soon like sailors we were hauling ourselves up by our fixed ropes. By virtue of the previous days' preparatory work, we quickly gained height, and after two and a half hours, at one o'clock, we stood at last on the west col, and so at the starting point for our final attack on the summit.

A "mere" 1300 ft. now stood between us and the heavily overhanging summit cornice, but an impending storm and an incipient blizzard put a veto on

Plate 45: Caca Aca (20,280 ft.) and Huaina Potosi.



any further advance that day. We were faced with the decision, whether to make our way back 3000 ft. down through the storm to the moraine camp, or to bivouac on the spot. The increasing blizzard left us no choise, and we spent the night in the snow-shelter we constructed with several hours work. By virtue of the ice-blocks with which we closed the entrance, the temperature in our dwelling fell to only five or six degrees of frost Fahrenheit, as compared with thirty-four degrees of frost outside. Still, it was scarcely an agreeable night; as I had made no provision for a real bivouac in estimating our needs, we were naturally provided only with indispensable necessities. Bad weather clothing and reserve underclothes, paper and foam rubber groundsheets, together with our light Vicunna ponchos, protected us very well. But we lacked a proper cooker; so we melted snow in a two-inch film case over the stub of a candle. Even the sight of the candle flame awoke new life in us, as did especially the divine drink I brewed. A sweet gave it taste and a coca leaf the real content. Each had two portions, that is two little draughts of hot tea, and then the candle stump was burnt out; we had finished our last hot drink for forty hours.

When in the early dawn we pushed the blocks away from our shelter's opening, we were met with icy cold. Nevertheless, although somewhat stiff in the joints, we forthwith attacked the last pitch of the ridge, the gradient of which was as yet not more than about forty degrees. Bare ice alternated with deep fresh snow. One great steep section especially, in fresh snow in which we sank to our belts, kept us busy; at any moment we might be swept down on this avalanchy slope. At ten o'clock we stood again at last upon the firmer ridge; up there at each step the strong wind tore streamers of snow from beneath our feet. The view across to neighbouring Hancouma was fantastic; the view down towards Sorata, in the midst of green trees, and over to Lake Titicaca aroused many a longing. But the icy wind did not allow us to linger on the shady side, despite the unique view.

At eleven o'clock we stood under the last bastion between us and our goal. It was about 200 ft. of particularly steep climbing that we still had to do. Fortunately to the right of it we found a gully leading up to the top section of the south-eastern ridge. A distance of two rope-lengths along the flatter summit ridge brought us to our goal. My companion had carried a bamboo pole and a Bolivian flag the whole way, and at exactly noon we were able to plant them on the summit cornice. At just this solemn moment the storm tore a rent in the mist, so that we were fortunate enough to take a good photograph of the flag with Hancouma in the background.

Our awesomely overhanging summit ridge faded out mysteriously in the mist towards the still unconquered north summit. Granulated snow, whipped

Plate 46: Abseil on the Huaina Potosi.

over the top by the storm, forced us soon to leave our hard-won goal, inhospitable as it was; the increasing violence of the blizzard so spurred us on that by four o'clock in the afternoon we were back at our bivouac, where we made only a short halt, driven on by hunger and thirst. How long was it since we ate or drank? We felt overcome by a most strange weariness, a frantic longing to sleep. The efforts of the last days and hours had been superhuman. At six in the evening, after several tricky manoeuvres with the rope, we reached the foot of the face, and I crossed the broad gap with a leap of joy. When at last we reached our camp, mountains and glaciers were hidden in the darkness of the night. The tent was still standing, but it had been completely ransacked, probably by our own bearers, no longer thinking we could return. Without sleeping-bags or any warm equipment, we felt we were bivouacking again. Fortunately we had hidden our instruments, apparatus and weapons amongst the adjacent rocks. Despite frozen toes, I set off for Hancuma village on the morning of 13th May to get porters to bring down the camp. I sent news of our success by mule messenger to Sorata and La Paz. On the night of 15th May my friend reached Hancuma with the rest of our possessions.

The extreme hardships we had endured and the loss of some of our equipment, including important official papers and my passport, could not affect our good spirits and the joy of having triumphed over one of the finest giants of the Andes.

While on the 16th we were making our way back to Sorata over the Abra del Tipuani, we noticed a plane several times circling about the top of the Illampu. In Sorata itself we were received as men returned from the grave. The express message I had sent, giving news of our success, had failed to reach either Sorata or La Paz, and so our friends at La Paz, the "Club Andino Boliviano" and the Bolivian high command had organised a rescue expedition with aircraft, cars and mountain hunters. Fortunately I was just in time to call the whole operation off. The search party, having arrived with jeeps and lorries at Hancuma, where they got news of our safe return, entertained us the same night at Sorata as enthusiastically as if we had climbed Everest. I can but express my unbounded appreciation of the friendliness of these disinterested helpers and of the spirit in which they set out on the rescue. As leader of the German Andes Expedition, I observed with great pleasure the exceptional interest always shown to us in this hospitable and magnificent country.

During a weekend, three weeks later, with the young German Bolivian, Gert Haryes, from the Zongo Pass I climbed the Caca Aca (20,280 ft.), southern neighbour of the Huaina Potosi. In the midst of my preparations for another major expedition into the primeval forest, I was invited by the Bolivian mountain troops to lead a patrol up the Sajama (21,425 ft.), Bolivia's highest mountain.

Operation Sajama

"Operation Sajama" has a military ring, and rightly so.

The Andino regiment's desire to climb the Sajama happily coincided with my own wish by any means to include Bolivia's highest mountain in our collection, and thanks to the excellent organisation of Destachamento Andino I, and particularly its commander, Colonel Alcocer, a long-contemplated civilian mountaineering expedition was converted, with the most friendly cooperation, into a military undertaking, which was carried out with minute precision.

On Wednesday 11th July, 1951, at 7 a. m. precisely, an Andino regimental lorry left our quarters at La Paz for Altiplano–Sajama. Balanced on the boxes and sacks of our extensive equipment were the officers, Sbte. Ramon Azero, my Illimani companion of the year before, Sbte. Alfonso Villalpando and Sbte. Lucio Arce, four other ranks and ourselves the civilians of the German Andes Expedition. After a varied ride alongside the La Paz–Arica railway line, we left Calacoto, and in the afternoon we reached without mishap the Curahuara de Carangas garrison, to the west of the Sajama, where we were most hospitably received by the commanding officer.

That we had to leave this lovely spot on the following morning made us really sad; it would have offered several members of our mission ample scope in the picturesque rocky landscape and in the exceptionally interesting frescoes of the church.

Towards noon we passed Tomarapi, situated at the north-west foot of the Sajama, and after several hours reconnoitring beyond the Pueblo Sajama I decided on the approach from the west flank, from the picturesque hamlet Tomarapi. Our night encampment in the precincts of the church with its belfry, little side chapels and flying buttresses, was most exhilarating, cheered by our camp-fire and a roast on the spit; and when we set out next morning across the pampa like a great host with our proud troop of twenty pack-asses, we all felt in good fighting trim. Unfortunately the quenuar trees and shrubs at the foot of the Sajama, of such exceptional botanical interest, had been almost exterminated by the ruthless charcoal burners.

A four-hour march from Tomarapi brought us to a small pampa, protected from the wind, at 15,830 ft.; as we found plenty of dry wood there, as well as food and water for our beasts, we set up our base camp at this ideal spot.

With heavy baggage and with most of the party, I proceeded next morning to attack the great slopes of scree descending from the north-west side of the mountain. Heat shimmered over rock and scree; of every three steps we took forward we mostly slithered back two in the loose scree; but by dint of hard work the major part of our loads and apparatus was deposited by four o'clock in the afternoon at 18,870 ft., in a gap of the western ridge, which I had picked out from Tomarapi as a good site for a high camp, and which is brought into prominence from afar by a striking rocky eminence. Going back down the steep slopes of scree, we reached our base camp again in just an hour, having taken four and five hours going up. Next day we came up to the high camp with new loads, finally to install ourselves there. On the morning of 16th July our thermometer registered 47 degrees of frost Fahrenheit, and to make an early start in this savage cold called for all our resolution. So we did not stagger off until about nine o'clock, when the sun had warmed us a little, in order to tackle with the ice-axe the top few hundred feet of a huge ice-filled couloir. At an extraordinarily steep angle this ice-channel shoots down well over 3000 ft. to the south-western depths. The ice was extraordinarily hard, and brittle as glass, sometimes having edges as sharp as a knife.

Towards noon I reached a small gap, where I installed my companions, Gert Haryes and Alfons Hundhammer. I had a good job of work behind me, an impressive series of steps with fixed ropes secured by ice-pitons or wooden posts at the most dangerous point. We had a clear way ahead over an easy rock ridge, which merged higher up into the mighty ice-slopes of the west flank. At two o'clock we deposited our emergency weather clothing amongst the last rocks at about 20,000 ft., and decided to rest there; indeed, in view of the knife-sharp ice-stalactites, some over a yard high, which are distributed in close array up to the summit like armoured protection of a modern fortification, it was improbable that we should reach our objective before nightfall. A solitary plane, which flew around our mountain several times during the afternoon, would scarcely have detected our ant-like figures amongst the dark rocks. A collapsed cairn near our equipment depot revealed an Italian ribbon attached to the card of the famous Italian mountaineer, Ghiglione, an old friend of the Dyrenfurth expedition to the Karakoram Himalayas; as far as we could make out from the writing, "Bimbo", as we always called him, had been here in 1935.

By virtue of my preparatory work, our return to camp without baggage and assisted by the fixed ropes went off according to plan, and I felt I could look forward with comparative equanimity to our joint expedition of the following day. Despite the extreme cold, we set out on 18th July before the sun's rays had reached our tent. This time I divided the "assault troops" into four roped parties of two men each, allotted in a series according to our several blood pressures. My blood pressure and that of the Indio soldier, Feliciano Mamani, proved to be the best, and so with him as my new rope-mate I went on as the first party, being followed successively by the others, Sbte. Arce and Hundhammer bringing up the rear. Gert Haryes, my gallant companion of the Casa Aca, who had shared most unselfishly in the preparatory work, unfortunately had now to stay behind because of angina trouble that looked serious. I quickly got my people forward in the previous day's steps and by the fixed ropes, until by ten o'clock the last party had reached our depot at about 20,000 ft.

With my rope-mate coming along splendidly, I forthwith attacked the steep declivity lavishly sprinkled with hazards, over which passed the route to the summit. In an hour and a half the "fortress obstacles" were overcome, and we could proceed upwards on good, fairly firm firn-snow. We worked our way up almost automatically, twenty-five yards or fifty steps at each go, placing our feet mechanically one after the other, as I had been accustomed to do since my climbs in the Himalayas, with one minute intervals to get breath, as the hard labour went on. At exactly one o'clock Mamani and I stuck our ice-axes into the snow beside the heavy rucksacks at the highest point in the immense summit plateau of the Sajama. At 21,425 ft. this was also the highest point in Bolivia. Not until an hour later did the second party join us, and in another half an hour the remainder had achieved the objective. The weather was perfectly clear, and the view was magnificent.

We all cut great blocks out of the wind-caked snow, and constructed a cairn taller than a man to hold the Bolivian flag we had brought with us. The bunting crackled in the wind, as the three officers and three other ranks lined up and saluted it with ice-axes at the present. At this solemn moment there was none on the broad summit who was not moved.

At half-past three in the afternoon, when I had finished my measurements and filming, we left the summit. In two and a half hours we were all back at our top camp to celebrate our success with hot supper. Next day we dismantled this camp and returned to the base camp; three days later, on that unforgettable Saturday evening, the 21st July, 1951, after a magnificent ride by lorry and train, we saw again from the Alto the sea of houses that was La Paz. As our train drew into the capital, we were met by resounding military music; a vast crowd thronged the platforms. Colonel Alcozer, commander of the Bolivian mountain troops, as well as senior officers of the La Paz garrison, had come to congratulate me personally on my leadership of this detachment up the highest mountain in Bolivia. Overwhelmed with flowers, we were accompanied to our quarters in a real triumphal march.

I would conclude by expressing my profound thanks to all the participants; as regards my uniformed fellow climbers, I believe I shall reveal no military secret in saying that with such gallant mountaineers as officers and men the Bolivian mountain troops have a great future.

A few days later I flew by a government plane towards the Brazilian frontier with a fresh party, which included two newcomers, the geologist Dr. Haberfelner and the botanist Dr. Schmid, as well as Frau Milli Bau; I was the only representative of the original expedition. For months, together with a Bolivian boundary commission, we investigated the area where the rivers of the Rio Verde and the Serrannia Ricardo Franco rise. In these primeval forests along the borders of the Matto Grosso, Fawcett perished, and of a four-man expedition a few years earlier only one had returned, bereft of his reason. We investigated also almost the whole Velasco province with its former Jesuit missionary stations, now fallen into decay but offering material for the student of art history.

In the course of these activities we covered, between La Paz and the field of operations, no less than 750 miles by plane, over 1000 by lorry, 225 on horseback, 100 in ox-carts and 353 on foot. The greater part on foot was through completely unknown virgin forest, which had to be made penetrable by axe and bush-knife. What more shall I say of the marvels of the tropical forest, the adventures of our research work and our hunting experiences? Shall I describe how I was bitten by a joperohobobo, one of the most poisonous snakes of South America, and was saved at death's door by my Indio companion, who dug out roots I did not know, boiled them and gave me the decoction to drink? Shall I tell of the marvellous colonial achievements of the men of the Order of Jesus two centuries ago in these untracked regions of primeval forest; of their missions, their magnificent works of art and buildings, whose last efforts were nullified on the expulsion from the primeval forests of these apostles of peace by a present generation without understanding?

This would lead me too far afield. I would recall this tropical interlude only incidentally to note the fact of this undertaking.

THE SOUTH PERUVIAN ANDES

By Piero Ghiglione

The southern part of Peru is still to-day an immense field for the explorer and mountaineer, since a quantity of virgin summits is to be found there, many of them exceeding 6000 m. (*c.* 20,000 ft.) in height. The best existing geographical maps show the better known giants, but they lack every indication as to a great number of other summits. I had the opportunity to ascertain this on my first expedition to the region in 1950, and it was for this reason that I wanted to return to southern Peru in 1952. As a result of the exploration done during the earlier year, I was certain that entire chains do not figure in the geographical maps of the country, even the most modern ones.

In the course of the expedition in question, we climbed two hitherto unclimbed giants, Solimana and Aussangate, as well as a virgin summit in the Coropuna group and two equally virgin summits in the absolutely unknown region of the Cayangate chain and of the Cordillera which stretches quite close to the great plain of the Amazonas, in a region equally unknown and never before traversed by white men. In this way we had been able to take a great step forward in the exploration of these wonderful Peruvian mountains, but giant strides must still be made if we wish to come near to defining the orographic system of this marvellous territory.

From the summits attained during my climbs of 1950, I had several times observed various unexplored giants. However, the opportunity to climb them only came to me two years later, when with the help of two good comrades it was possible for me to make up a new expedition. These comrades were a young Swedish climber and engineer, Anders Bolinder, and the Austrian climber Mathias Rebitsch. I had got to know them at the Himalayan meeting at Munich at the end of September, 1951. The business soon developed by correspondence to the point of settling all the essential problems and, among others, the date of the expedition. It is well known that an alpine campaign (and consequently an Andean one) requires good weather above all; that is to say, sure weather, and for southern Peru that means the period from the end of April till the end of July. Atmospheric disturbances are possible even at that time, but in all such cases they are very short; on the other hand this favourable period can sometimes be prolonged throughout the month of August. It was therefore a question of setting out at the end of April or at mid-May at the very latest. Unfortunately, hindrances not only to my comrades, but also to myself, resulted in delaying the arrival of Rebitsch at Lima until the 23rd June. As to Bolinder, held up in Sweden by a dock strike, he telegraphed that he would reach Lima some twelve days late.

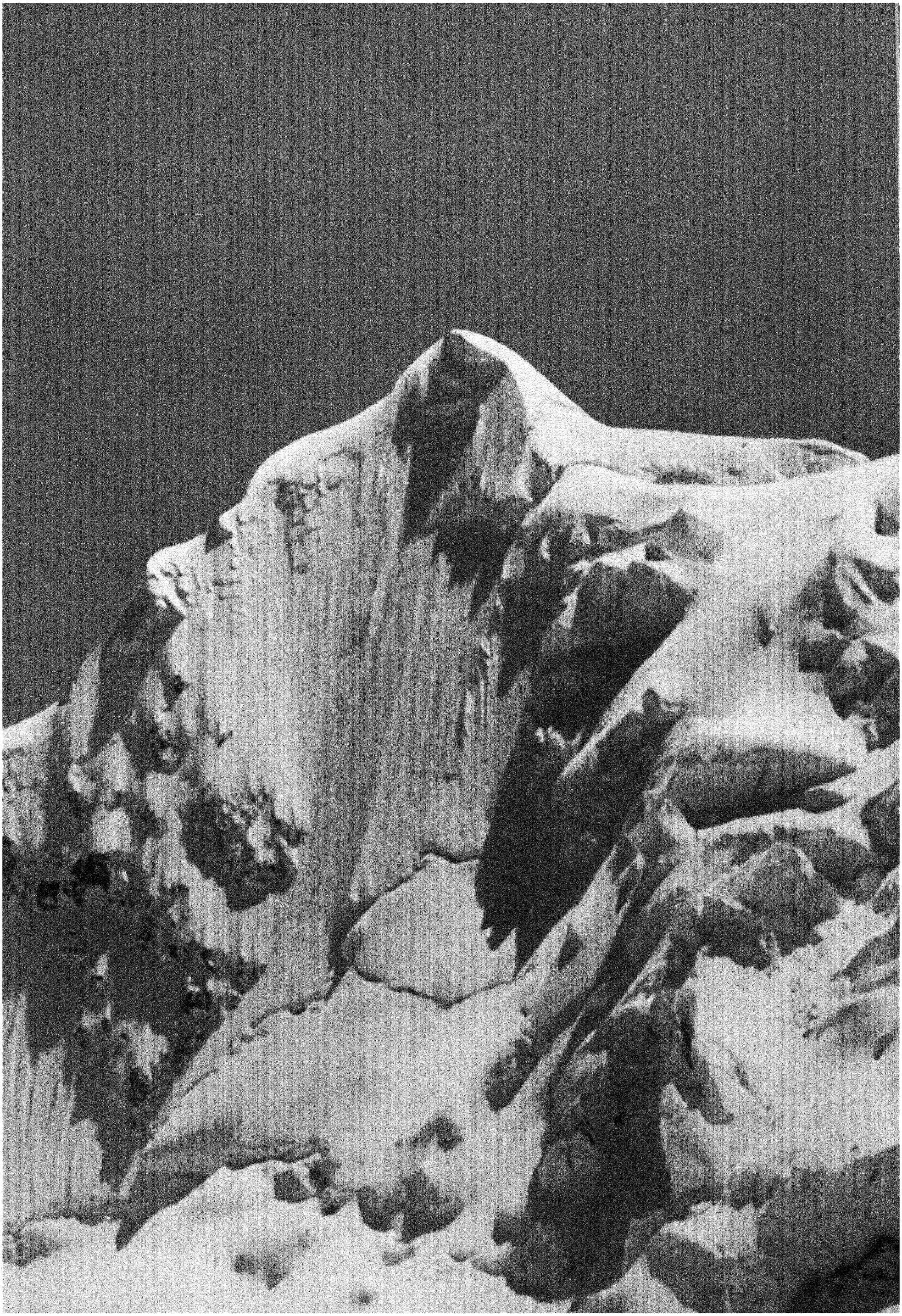
The consequence was that one of the giants we had wanted to climb was, by the time we arrived in the Peruvian capital, already the object of attempts by other expeditions: this was Salcantay (20,552 ft.) and its terminal dome was just being climbed by one of the expeditions, which in fact reached the summit on the 26th June. Thus we were obliged to abandon that mountain, while undertaking instead the exploration of other summits which figured in our programme. Among these were Solimana (20,746 ft.), which I had perceived on the 27th July, 1952, from the south-western summit of the Coropuna (21,697 ft.), and whose geological structure still remains a mystery. Solimana, in fact, has not the normal aspect of a volcano, that is, a more or less conical form, but presents instead the outline of a jagged ridge with pyramids and gendarmes, which by all evidence does not enter into the conception of a mountain formation due to eruptive phenomena.

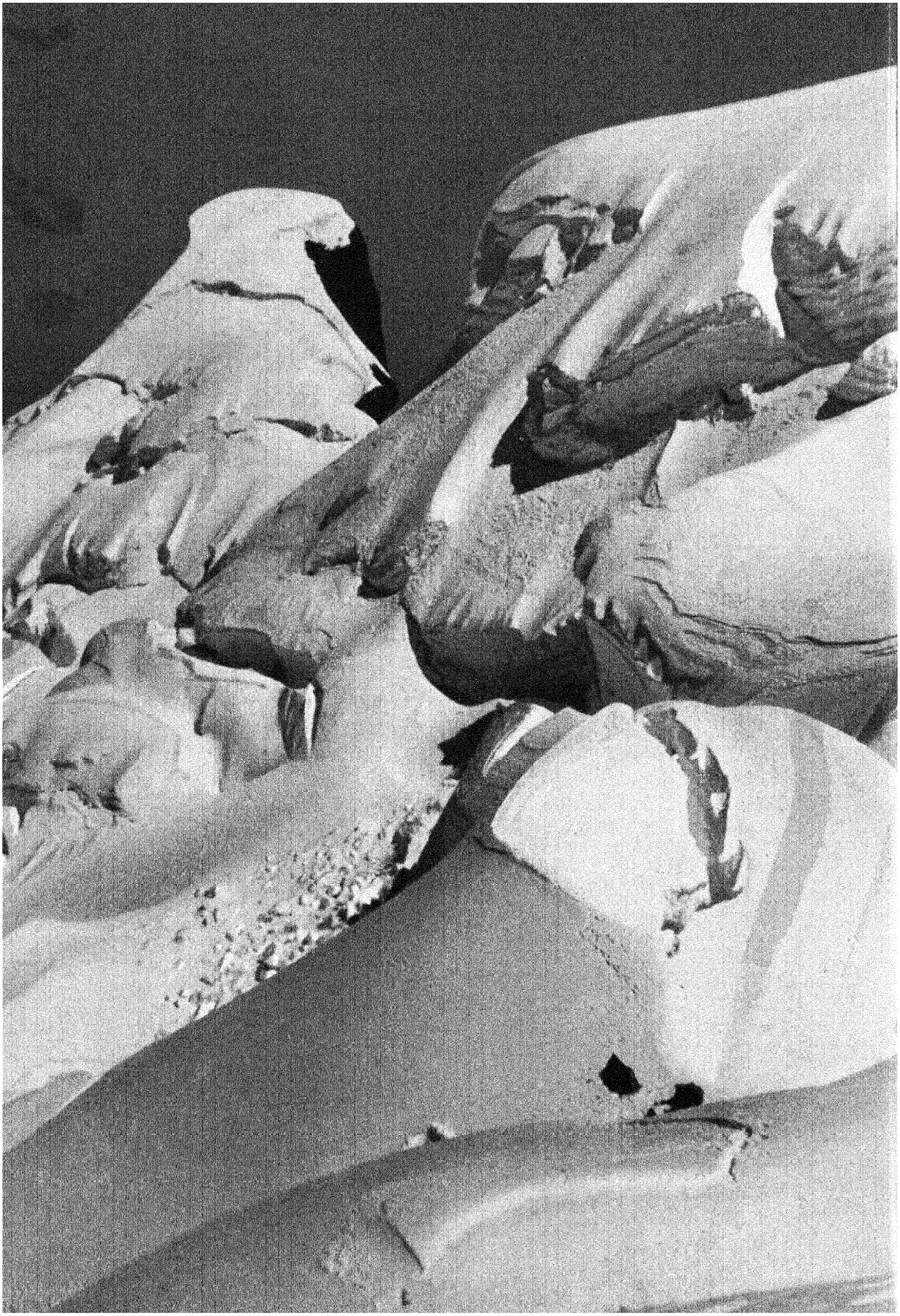
Our equipment had been entirely prepared in Europe. Rebitsch had been entrusted with the provision of clothing and footwear for the native porters whom we should have eventually to select on the spot; furthermore, he brought with him all the heavy material. He had therefore to come by sea. We had five tents with us (Moretti and Schuster), wadded sleeping-bags and thermic blankets, pneumatic mattresses, drums for water, crampons (Grivel and Mariner), manilla and nylon Füssen ropes, and long-lasting Zéta batteries. Bolinder, for his part, brought Primus stoves from Sweden, for burning petrol, benzine and solidified alcohol, as well as a quantity of vitaminised provisions and pharmaceutical goods. Rebitsch and Bolinder were provided with special lined footwear of Austrian type (Mariner); as for myself, I wore special ultra-light amphibious top-boots with soles of vulcanised rubber, which proved excellent in use.

Rebitsch embarked at Genoa on the 28th May and arrived at Lima on the 22nd June; I left Rome by air on the 15th June, and arrived at Lima, by way of Lisbon-Ile du Sel-Paramaribo-Caracas-Bogotà-Quito on the 23rd June. I had the advantage, during this long air voyage, of passing quite close to, and even of flying over, some mountain giants of Colombia and Ecuador.

At Lima we had the assistance of the representatives of our respective countries. On the other hand, the Peruvian Government departments had already

Plate 47: South face of Ausangate. View from Camp Va (18,045 ft.) of the north-west peak (20,506 ft.). (See p. 180 below.)





been informed concerning our expedition; thus H. E. the Minister of the Interior, Don Manuel Callager, had announced our forthcoming arrival to the Prefects and Military Commanders of the two South Peruvian cities whence we should set out on our various expeditions, that is to say, Arequipa in the south-west and Cuzco in the south-east. The Italian Ambassador at Lima, Baron Enrico Bombieri, had assured us of all his support and so had the Director-General of the Peruvian railways, the engineer Romero Leith, the Director of the Geological Institute of Peru at Lima, Prof. Jorge Broggi, and the Faucett Aviation Company. On the 26th June Rebitsch and I left the island in a plane belonging to that company. Thanks to a fine clear morning, we were able to observe from close range the southern and western slopes of Solimana, and we drew from this the conclusion that it would be advisable to attempt the ascent of the mountain by the eastern slopes or, perhaps better still, from the north, where the snow-line would probably be higher. At Arequipa, at 7500 ft., we met the geologist Alberto Parodi, a professor at the University there, with whom I had already been in correspondence from Europe. He willingly agreed to take part in the Solimana expedition, which rightly interested him because of its yet unknown geological structure.

The Prefect of Arequipa, Don Camino Brent, announced our arrival by telegraph to the Sub-Prefect of Chuquibamba, a chief town situated at 10,000 ft., from which we would have to set out to reach the foot of Solimana. The garrison commander of Arequipa, General Perez Godoy, put a sturdy soldier at our disposition, Victor Motta, aged 21. He was always punctual; nevertheless, on the very morning of departure he arrived late, so that it was by a miracle that the bus for Chuquibamba did not leave without him. This bus was known as "the gondola", probably because of its undulating movements while on the move. Thus we left Arequipa on the 1st July; along an appalling road, we crossed the Sihuas desert and climbed thereafter the splendid Majes Canyon, reaching our destination at the end of the afternoon after a journey of 160 miles.

We made a quite long stop at Chuquibamba for organising the caravan. An icy gale raged for three days; nevertheless, Rebitsch and I succeeded in effecting a preliminary reconnaissance as far as the first plateau of the *pampa*, to about 13,000 ft., so as to get from there a view of Solimana and to leave a part of our material in a cabin which existed in that region. The bad weather unfortunately prevented any real reconnaissance. Returning to Chuquibamba, we engaged muleteers and their beasts, thanks to the help of the Sub-Prefect, Don Julio Revilla; we also completed our provisions. On the 5th July we set out by car for Tambillo, the lonely inn of which I have just spoken, the last place which the road reaches with difficulty at nearly 13,500 ft. The weather was splendid.

Plate 48: Unclimbed west peak of Ausangate, seen from camp below the main ridge.

Gradually we saw Chachani outline itself against the sky, quite far off; nearer to us was Ampato, and finally, facing us, was the whole Coropuna massif, majestic and white with snow. On the other hand, Solimana could not be seen.

At Tambillo we found the muleteer, Manuel Montañez, who was waiting for us with four saddle-horses and three mules for the transport of the material. After loading the baggage, we left for the second plateau, situated at about 15,000 ft. We ascended thus on horseback for hours in frost and wind, blinded by swirls of volcanic dust. Various passes were crossed during the approach, which led us across a series of high valleys, the country becoming increasingly desolate and cold. It was only at five in the afternoon, from a pass situated at 15,750 ft., that Solimana (20,746 ft.) came before our eyes, still very distant, beyond an immense plateau which had the characteristics of a steppe. We were able to see its whole north-east face, precipitous and covered with snow. We would have to go further north, whence perhaps it might be possible to find a more feasible route to our goal. We descended for about an hour and towards twilight we camped in a small valley at about 15,400 ft., where the little torrent was already frozen. Luckily we had cans with us which had already been filled with water. During the night the thermometer fell to 31° (F.) below freezing point.

For two more days we continued the crossing of the high *pampa* plateau, camping for a second time at 14,450 ft. and for a third time at 15,600 ft., at the foot of the north-east wall. During the last afternoon I made a further reconnaissance and the following day we went up all together for a second reconnaissance to above 18,000 ft., climbing, with crampons on our feet, very steep slopes of snow and an ice-ridge. Solimana was right in front of us, but we established that we would have to carry the camp into another valley further north, since the mountain was easier to attack from this latter side. This we did the following day, after having succeeded in taking our beasts up to 17,250 ft., despite the opposition of the *arriero*, the chief muleteer. Up there, in the midst of sand and scree of clearly volcanic origin, we pitched our fourth and last camp.

The following morning, the 10th July, we left our camp at an early hour, climbing not without effort, having regard to the altitude—and even more because this was the beginning of our expedition—the slopes of scree above the camp, and then slopes of snow. After crossing the first glacier, which was covered with pyramids of pinnacle ice, we were involved in a long ice-ridge which took us to a height of about 18,400 ft. immediately below the very steep final face of Solimana. We were on a small plateau. After taking some nourishment, we took a direct line up the face which rose above us for about 2300 ft., at an angle in places of as much as 50°. This face, which was partly of ice and partly snow, presented its greatest difficulties in its latter part, very steep and all of smooth ice; it was there, too, that we were at grips with a violent wind, which was the more difficult because we were now in shadow. At last, at half-past three, after having accomplished some acrobatic climbing, and having surmounted the only rock buttress (andesite) in the whole face, we emerged upon the north summit, that is to say the final spur, which was so thin that we had to move along it astride. The altimeter recorded 20,588 ft., and the thermometer 21.6° (F.) below freezing.

Besides its northern summit, Solimana comprises a central point of the same height and a lower southern point with the shape of a parallelipiped and by all appearances quite difficult to climb. Before us, beyond the high *pampa* plateau, rose all the silvery domes of Coropuna. The descent was quite long; we reached camp shortly after twilight. This was the first ascent of Solimana's northern summit.

The following day we crossed the high plateau, passing right through its centre. Thereafter we descended to the river Armas, which flows deeply sunk in a *quebrada*. To cross this wide and impetuous watercourse proved dangerous. With our mounts we climbed the very steep further bank, reaching the high steppe plateau once more, traversing it in a long ride until it was dark, to the moment when we had to pitch another camp at 14,750 ft.

On the morrow, while Prof. Parodi went back towards Chuquibamba, having business to deal with in Arequipa, Rebitsch and I, with the soldier Motta and the *arriero* Manuel Montañez, ascended the vast north-western slopes of Coropuna with the object of reaching the foot of the giant mountain and trying the following day to climb its north-western summit, which seemed to us the most central and likely to give us a complete view of the interior of the former crater of Coropuna, of which there only remains to-day six ice-covered domes and one rock point.

After further numerous entreaties from the muleteer (who, however, was able to run with greater agility than a goat over slopes upwards of 16,000 ft.) we arrived with our mounts—one can, in fact, have complete confidence in these little Peruvian horses—at an altitude of 17,700 ft. It was there, quite close to a sort of barrier of great volcanic rocks, that we pitched our camp. The wind was extremely violent and terribly icy in addition. In the night the temperature fell to 40° (F.) below freezing.

The next morning we left camp at dawn, despite the very intense cold. Together with the soldier Motta, after surmounting scree and blocks of volcanic rock, we soon reached the north-western glacier of Coropuna. Pyramids of pinnacle ice, followed by a series of large crevasses, some of them invisible and all of them insidious, as well as a deep bed of snow in which we sometimes plunged to our knees, forced us to ease the pace of our march. The glacier, in fact, turned out to be immense, contrary to what we had reckoned at first contact, misled by the clarity of the atmosphere. Rebitsch took extreme care, but that did not prevent him from twice falling into fissures in the ice; fortunately, it was possible each time to hold him up, thanks to the rope. At half-past three we had already reached a height of 19,700 ft.; nevertheless we were only half-way through the glacier. Having regard to the late hour—at this altitude the sun sets at six and darkness falls immediately afterwards—we were obliged to regain our tents.

We took a day's rest at the camp: Rebitsch made use of it by instructing the *arriero* in the use of climbing material, since on the next day he too would come with us. A violent wind obliged us to retire into the tents early; before the sun set, benefitting by the most limpid atmosphere on earth, we were able to admire the imposing outline of Sara-Sara, which rises about twenty miles to the west of Solimana and which, we were told, is still virgin: among the former volcanoes of this region, this is the nearest to the Pacific, having an altitude of about 20,000 ft.

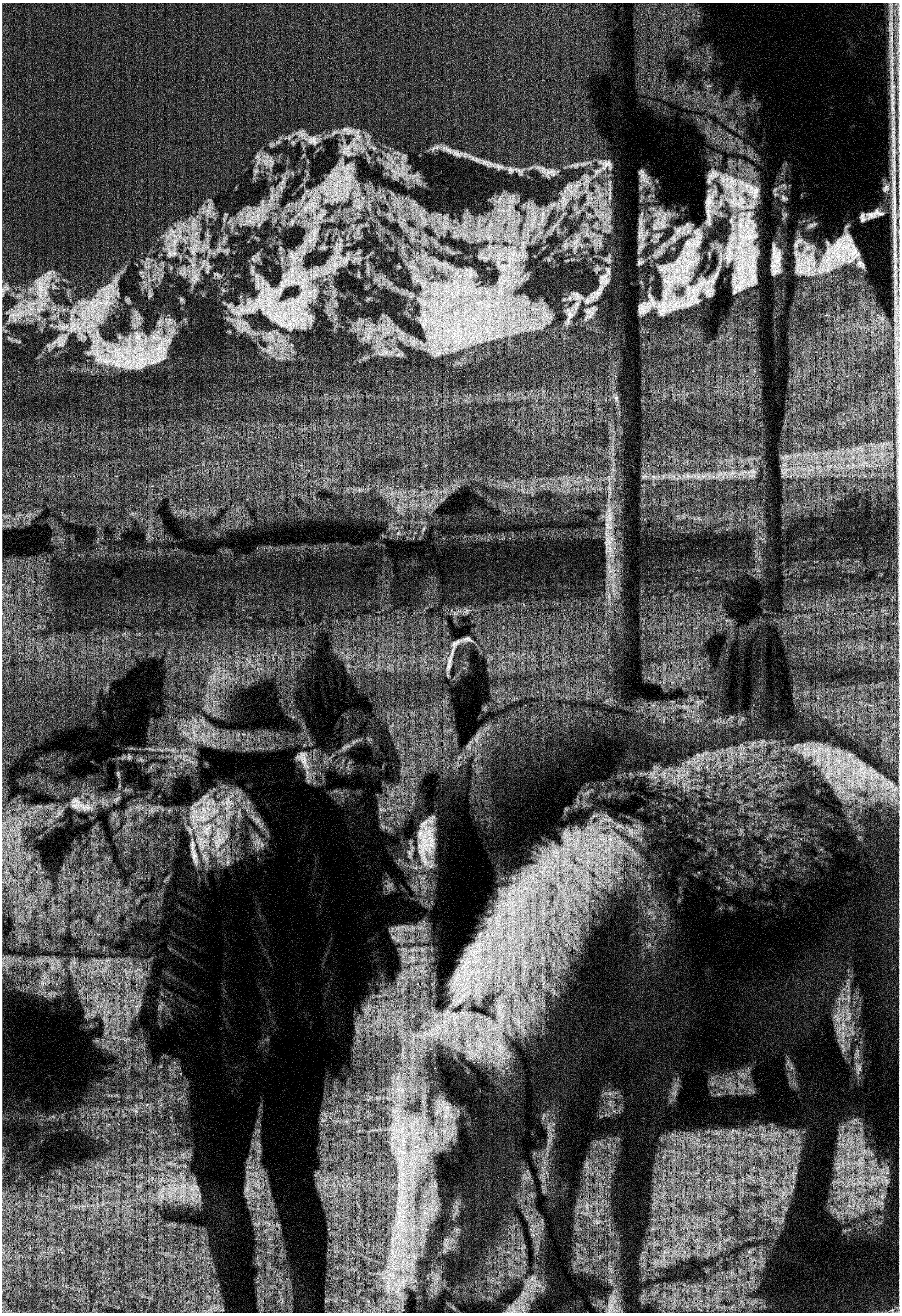
On the morning of the 15th July, we set out at first light. Thanks to our tracks we succeeded in reaching the limit of the earlier attempt in scarcely three hours. But the altitude, the increasing steepness of the slope, as well as some formidable crevasses, made us lose still further time. Meanwhile, the atmospheric conditions were no longer as favourable as they were; there was a very violent wind that soon became a real hurricane; furthermore, very deep snow, as instable as sand, presented an obstacle to rapid progress. Thus it was only at half-past two that we succeeded in reaching our goal, half-blinded. The altimeter recorded 21,425 ft., and the thermometer, which we could read only with difficulty, recorded 40° (F.) of frost. We got back to camp late in the afternoon.

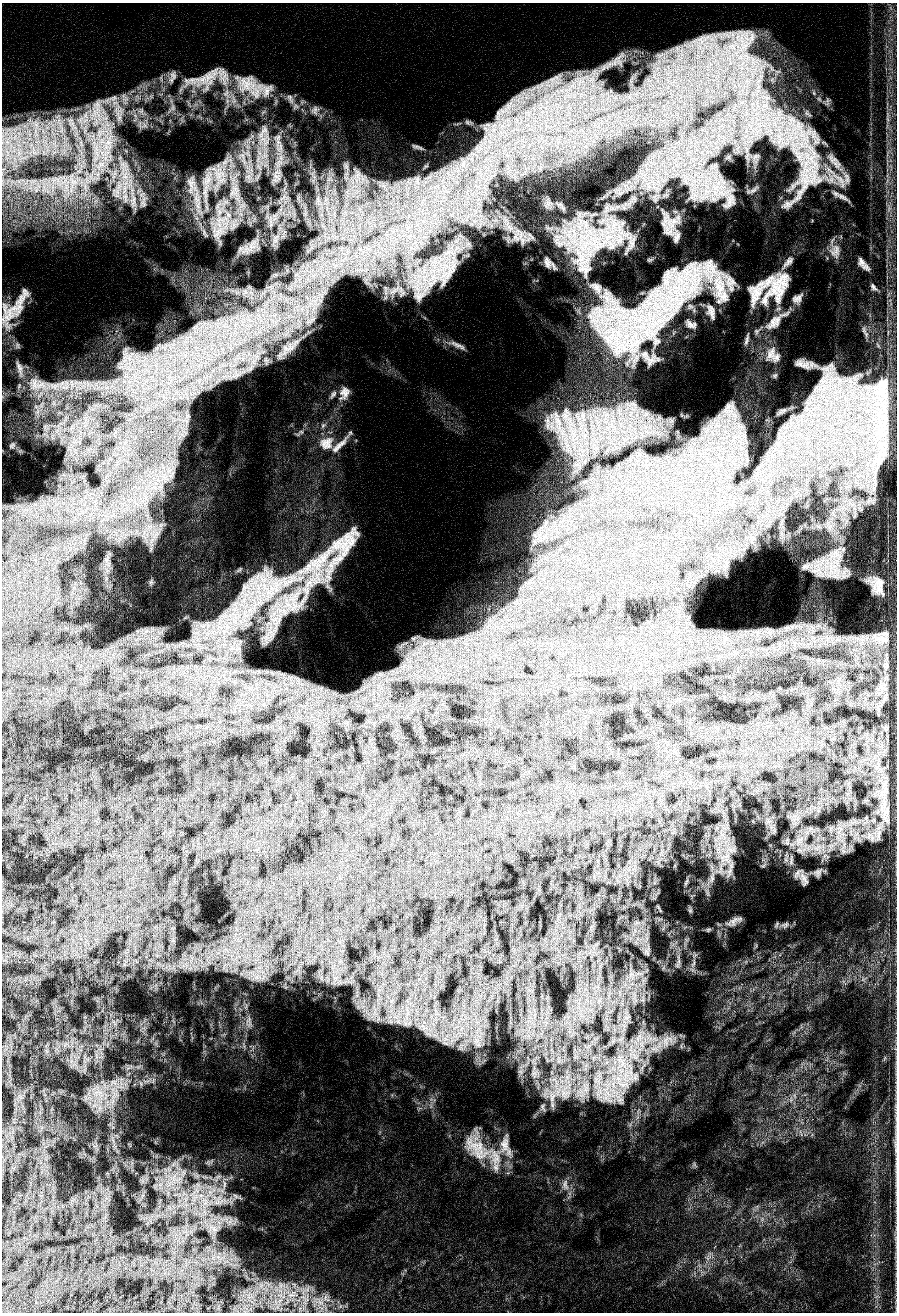
Despite their rounded structure, shaped like calottes, these summits of Coropuna require considerable effort on the part of the climber, either because of the fact that clouds gather very often around the culminating points, or because of the extreme cold, or the extent of the glaciers which are crevassed in a way without comparison with those of the Alps, or finally because of the bed of powder-snow.

On the next day we started along the road back to Chuquibamba. In order to accomplish this as quickly as possible, the *arriero* wished to traverse some steep and snow-filled *quebradas:* there our mounts, which until then had performed miracles, encountered excessive obstacles. Some of them rolled to the bottom of the slopes with their loads, but thanks to the bed of snow there was no damage. Once the high plateau of the *pampa* was reached, we began a mad ride across the

Plate 49: Hacienda Lauramarca (13,100 ft.) with view of north face of the Ausangate chain, dominated by the main summit (21,650 ft.).

Plates 50–51: Unnamed 19,600-ft. peak between Ausangate and Cayangate, taken from just above camp at about 16,100 ft.





little sandy dales, dotted with a few shrubs, until we reached Tambillo, just in time to load all our material on to the providential bus which connects this remote place with Chuquibamba.

At Chuquibamba we met Bolinder and his young wife. We returned with them to Arequipa. From there our expedition transferred itself to Cuzco by *ferrocarillo*—that is to say, by railway—a journey of two days. There, at 11,000 ft., we at once began our preparations for our new exploration, the object of which was Aussangate. The Prefect of Cuzco, Don Alhardo Lanfranco, as well as General Enrique Indacochea, gave us very valuable help. Thanks to the general's intervention it was possible to attach a Peruvian N.C.O. to our expedition: Corporal Luis Rojas, a real giant. He revealed himself a clever and useful assistant, as well as a very strong walker; further, he was of great use to us as an interpreter, since he spoke the *Quechua* tongue.

On the 25th July we left the former Inca capital in a car belonging to the Hacienda Lauramarca, placed at our disposal by Don Carlos Lomellini. To reach the Hacienda (a word which means "farm"), situated 13,300 ft. up on the great plateau between the Caravaya and the Vilcanota Cordilleras, we had to go first of all to the little town of Ocongate at 11,200 ft., about 60 miles from Cuzco. At Ocongate we were met by the *Gobernador* and the bailiff of the Hacienda Lauramarca, Ermenegildo Cerillo, who had already brought together the natives and the horses necessary for our expedition. After loading part of our material (about 700 kg.) we reached the farm on the evening of the same day. It is situated in the heart of the plateau of which I have just spoken, in such a way that one can enjoy a magnificent view upon the imposing massifs of Aussangate, which form the dominating group, of Cayangate and of Coyllorite.

On arrival we were preoccupied at once with completing our preparations. Above all we carried out some reconnaissances of the north and east sides of Aussangate. The first of these reconnaissances, made by myself and Corporal Rojas, led me to the conclusion (which I had already reached two years earlier, on the occasion of my first expedition with M. Girando) that any possibility of making an attempt on the northern side—the side facing Lauramarca—must be ruled out: it is, in fact, a precipitous face, down which avalanches of stones and ice fall continually. The second reconnaissance, which I made with Rebitsch and Corporal Rojas, lasted three days, while Bolinder remained at the Hacienda to put our baggage in order, and especially our provisions. On the first day, by a six hours' ride, we moved round to the eastern side of Aussangate; during the

Plate 52: North-east face of Cayangate III, west peak to the right, east peak to the left. Seen on the way up to the north-east col.

second day we crossed the glacier which lay between our camp and the east face of Aussangate, and afterwards climbed a short way along the same wall, until eventually we decided to abandon any attack from that side, in view of the fact that the approach march would be too arduous for heavily laden porters and entailed some serious dangers from falling stones and avalanches of ice. On the third day we came back to the Hacienda.

A whole day was employed thereafter in equipping some native porters in mountaineering style and in teaching them to use the ropes and crampons. This provided more than one amusing episode. On the 1st August we finally took our departure with eight natives and sixteen animals, climbing arduously up a series of long and difficult valleys, with a view to turning Aussangate on the west and getting around to the south side, the only one possible henceforward, although it was filled with extremely crevassed glaciers. After a ride lasting two days, during which we crossed two passes of over 16,000 ft., we camped at the south foot of Aussangate, close to an opal-coloured lake. The whole southern side was examined carefully, after which we decided to take the camp up as high as possible under the south-eastern glacier, since this giant's highest summit rose from the eastern extremity.

Formidable cataracts of ice defended access to it, and it was a question of attempting—or forcing—the passage which I had found closed in 1950, during my first expedition. This time the season was further advanced than on the first occasion, since we were already in the month of August. After much solicitation of the muleteers, together with offers of *propina*—that is to say, tips—I succeeded in reaching 16,700 ft. with our horses, right to the lower edge of the fall of séracs. Our camp was pitched quite close to a little glacier lake. We built up small walls for the kitchens and shelters for the natives, Bolinder having brought several large pieces of canvas in the baggage.

For several days we endeavoured to make tracks across the séracs, with the object of getting above them. The snow was often knee-deep, the labyrinth of crevasses impossible to describe, while the séracs which threatened to fall on us from above were innumerable. There were also numerous snowfalls, the weather in Southern Peru not being very favourable in 1952. Every evening we returned to camp after hours of work, sometimes in fog and finding difficulty in following the pennons with which we marked our route. It was often necessary to have recourse to manoeuvres with the rope. Rebitsch climbed up over vertical walls of séracs, previously pitonned; he performed every possible kind of acrobatics from the splits to descents *en rappel.* We tried various routes, but everything proved of no avail and we had to beat a retreat.

After a further examination of the immense south face, which we made from the peaks facing Aussangate, we decided to transfer the base camp nearer to the centre of the giant and attempt a route rising vertically above the new camp, which was pitched at 15,900 ft. So as to make the march of the laden natives secure, we had to fix ropes both to the polished rocks below the lower fall of séracs and to the first part of the passage across the séracs. The natives behaved manfully, both in crossing these first obstacles and in ascending the upper fall of séracs, which was steep and exposed.

We finally succeeded in pitching a tent at 18,000 ft., on a small plateau, right in the middle of crevasses and séracs. But that was the safest point in this immense labyrinth. The natives went down again with Bolinder, while Rebitsch and I spent the night up there. The next day, with the greatest difficulty, in snow which reached above our knees, we traced a route towards the final ridge of Aussangate. The following day we were rejoined by Bolinder and by the porters with further loads. On the third day, having improved our track, it was possible for us to ascend all together and pitch a high camp of two tents at 19,850 ft., just below the ridge, access to the latter being barred by tremendous crevasses. We knew then that the Indios would not be able to go any further, because of the complicated nature of the upper region. But Corporal Rojas, on a single occasion, carried that far a load of 50 kg. (*c.* 1 cwt.). During the night the thermometer fell to 43° (F.) below freezing.

The next day, the 15th August, leaving shortly after dawn, we opened up a route across the extraordinary maze of crevasses by going down into and climbing out of the chasms. The track, made through deep snow and up very steep slopes, was taken as far as the final ridge. This being reached at last, we began its traverse, which lasted two days. This interminable shoulder stretches from west to east for about two miles, part of it being thin and exposed, with cornices which, being sometimes of ice and sometimes of deep snow, entailed numerous dangers.

So, at the end of the afternoon of the first day, having overcome innumerable obstacles, including two ice-walls at an angle of about 50°, we arrived below the central summit, that is to say, about half-way along the ridge. At this point, two enormous crevasses, at right-angles with one another, seemed finally to bar our way. Earlier, we had already been forced to find alternative routes on either side of the ridge, cutting trenches through the overhanging humps of snow. But here there was no choice, if we were not to go back. Doubly secured from above, Rebitsch began the passage of the vertical crevasse on top of an absolutely precarious snow-bridge, then ascended the opposite lip of the crevasse and reached the central summit at 20,834 ft. It should be noted that below the vertical crevasse just mentioned there was a precipice of 5000 ft. and that the final wall before reaching the highest point of the medial ridge was almost perpendicular. After reaching the central summit, Rebitsch wished to discover if it were possible to proceed beyond it towards the eastern summits, and this, in fact, did seem to him so. He then descended and all together we started the return—since it was hardly possible to remain up there—to the upper camp at 19,850 ft. It was only late in the evening, darkness having already fallen, that we reached the tents.

The following day, thanks to the fact that the previous day's tracks had become firmer, we made the same passage in about three hours and continued across new obstacles and dangerous cornices. The further we moved away from our last camp, the less did the weather inspire our confidence. Fresh difficulties arose when crossing some crevasses which opened up on the very ridge, as well as some rock spurs. At a quarter past two, when a few snowflakes began to fall, we at last reached one of the three main eastern summits: the altimeter, duly rectified, recorded 21,326 ft., and the thermometer 25° (F.) below freezing. This immense ridge had been vanquished and the mystery which until then had surrounded the possibility of traversing it could be regarded as solved, since the most difficult of the summits had been conquered. After photographing the flags of Italy, Sweden and Austria floating from our ice-axes, we began the return journey in the midst of a tempest. Luckily its violence was about to slacken and this saved us.

At half-past six, when the last ray of light was about to fade, we arrived at the last slope, just above our tents, at 20,000 ft. The morning after, while I remained in wait for the porters who were to ascend to the camp and pick up the material, Rebitsch and Bolinder went up on to the ridge again to take some photos; they took advantage of the fact that the porters had not arrived by climbing another neighbouring summit, the north-west point of Aussangate, a thin vertical needle, completely ice-covered, reaching to 20,500 ft., which had always seemed to us from below as something belonging to the ether. At ten o'clock they had returned to the tents. In the afternoon the tempest arose once more; however, in the evening the sky became clear.

I then decided to take my revenge. Having left the camp very early, I was able to climb that attractive needle in my turn: on that morning I went almost as far as the ridge, being conditioned to the altitude after so long a stay up there. On my return to camp at about 8.45 the Indios at last arrived, so that we were able to take down the tents and descend to the base camp without stopping. On the morrow we left the base camp in order to return to Lauramarca; on this same day there was an eclipse of the sun, a great cold developed and in the afternoon a storm broke out which was to last for four days.

During the reconnaissance of Aussangate at the beginning of August, we had observed on the nearby chain of mountains to the east—that is to say, in the direction of the Cayangate, which is quite unknown—a series of ice-covered giants of formidable aspect. We therefore decided to explore it, once Aussangate had been climbed. After a few days given over to new preparations, we left Lauramarca on the 25th August with a train of Indios and horses. Having crossed some high passes of about 16,500 ft., where we were surprised by snowfalls (one of which rendered the descent into the next valley very dangerous because of the steepness of the slope) we entered the heart of the unknown massif, taking the direction, to begin with, of the summits of Cayangate, the most important group.

As it was given us to establish later, Cayangate itself constitutes a considerable mountain group with various summits, three of them absolutely precipitous and all of them difficult of access, either by reason of the crevassed glaciers, full of séracs, or of the vertical ice-covered walls. We camped in the bottoms of narrow, snow-filled valleys, afterwards crossing further passes, until we arrived facing the grandiose northern wall of Cayangate. In view of the insurmountable character of such a rampart, we were forced to turn it in the hope of finding a weak point in its last bastion to the north-east. We gave the name Cayangate III to this latter summit.

It was necessary to cross moraines with a surface of ice, where our little horses nevertheless performed miracles. On the fourth day, the 29th August, leaving our 15,400 ft. camp at dawn with one native porter, we ascended a glacier scattered with ice-pinnacles and were forced to turn Cayangate III on the north-east with the object of seeing if there was a possibility of climbing it on that side. Thus we arrived at a pass which opened on to this north-eastern side at a height of 16,400 ft.; from that point we had before our eyes another fantastic chain of ice-covered peaks, one of which, the most imposing of all, was called Colchecruz by the natives, or "Silver Cross". Without further ado we decided to explore that chain during the ensuing days. Meanwhile, having pursued our way across steep slopes and along a ridge of ice, in the afternoon, despite the usual storm and after performing some climbing acrobatics across a rock wall, we arrived below the final pitch of Cayangate III which, from this side too, seemed to us inaccessible. The summit being conquered that day, we named it "Verena" after Bolinder's wife, who had always helped us in our various camps.

The next day, after crossing another series of passes of 16,000 ft., we came into the Colchecruz valley, where we were able to admire some glacier lakes, one of them coloured like mother-of-pearl. We camped that evening in the middle of the valley, ascending it the following day. At one point the valley divided into two: we pursued our way, ascending the right-hand branch for an entire day, securing a view upon superb summits and reaching, after having crossed a glacier that was over seven miles long, the highest pass in the region at 18,000 ft. Apart from the purely geographical success, from there also we were obliged to declare that the eastern ridge of Cayangate III was inaccessible.

We had thus already come to the 1st September. On that day we ascended the western glacier to 16,570 ft. The result of our exploration was that throughout this valley the surrounding summits proved more or less inaccessible because of the extent and the crevassed nature of the glaciers, as well as the jagged ridges, all covered with ice, on all the slopes, barring access to the summits. All these valleys were deserted. However, on the last day an Indios, describing himself as chief of the little community living in a neighbouring valley close to the great Amazonas plain, came to our camp. He told us that the lovely lake of mother-of-pearl was known as Ereratinte and that the valley with two branches was called Moyacocha. He offered to guide us to his valley the next day; its name was Yanacancha. So we arrived, after a long and arduous ride, on the other side of Colchecruz, which from this side too seemed to us very difficult of access. Would this imposing giant now become the object of further expeditions?

In the evening we camped in front of the cabin of our friend, the Indios chief. Towards the end of the afternoon his wife came back from the pasture bringing a large herd of alpacas. The hut was situated at about 15,750 ft., just below the last pass (about 16,400 ft.) we had crossed. After the usual evening storm we saw on the horizon another valley stretching to the south of the Amazonas plain, with a countless series of glacial peaks rising from both sides. We decided that the next day, the 3rd September, we would climb the summit which was closest to the plain in order to secure the best view of that immense basin and to see if there were other chains beyond.

After a few hours on horseback, we ascended a crevassed glacier which presented some strange formations in festoons and stalactites of ice. Following a long ridge thereafter, we arrived in the midst of hail upon the chosen summit, which reached to 18,000 ft. To achieve some success in photographing at any cost the fantastic world which surrounded us, we stayed for three hours on the summit. During various clearances, it was possible for us to verify the marvellous character of this exceptional viewpoint and the assembly of tremendous summits rising up on all sides except to the north-east. We had thus come in close proximity to the great Amazonas basin, the north-eastern side being the only one where there were no mountains.

On the 5th September, late in the evening, we were back at Lauramarca and, on the following day, at Cuzco. Our expedition then broke up. For my own part I was still able to spend some ten days in making a few further explorations in this very interesting country. With the Swiss climber Felix Marx, conqueror of the first summit of Salcantay (a summit which is about 300 ft. below the highest point), I made a few trips into the Yucai and Veronica Cordilleras, north-west of Cuzco, which are also unexplored. There are ice-covered summits in these massifs which reach to about 20,000 ft. In the two massifs in question, the bad weather prevented us from pushing on beyond 16,400 ft., but we were able to reconnoitre some great glaciers and some ice-covered walls, studying meantime the best route for future explorations. Interesting material was also collected concerning the flora of the Veronica massif.

In southern Peru entire valleys, with immense glacial stretches, still remain to be explored, while all their summits are yet unclimbed. The geological structure is a little different from one Cordillera to another, but the basis is always volcanic, with varying infiltrations, belonging for the most part to the crystalline. On Solimana I found quarzites with olivine; on Coropuna, limonite with iron silicates; on Aussangate, crystalline quartz and other species with an absorption of hematite. On Cayangate I was able to collect specimens of rhyolitic rocks with inclusions of quartz; on Yucai, rhyolitic volcanic rocks and olivine silica, as well as silicates with felspar; on Veronica, finally, quarzites with hematite and iron idrosside.

The snow-line also varies from one Cordillera to another; in general it lies at about 16,700 ft. on the north-facing slopes, while on the south it descends to 15,700 ft. The flora in the south-east of the country, at about 13,000 ft., consists only of a few thickset grasses. In the Veronica massif there exists, at an altitude of about 10,000 ft., a typically equatorial forest in full development with giant heaths, lianas, and multicoloured epiphytal garlands hanging from the trees, like what I have seen in the jungles of Ruwenzori. This is due to the special conditions of the soil and sub-soil, which are different from those existing in the other Cordilleras of southern Peru, especially the arid and desert western sector. The proximity of the Amazon regionas also has its influence.

The fauna is restricted to a few cameline kinds, of the lama and alpaca species; on the other hand, very rare is the vicuna; gardunas are found (beech-martin species), pumas, foxes, rabbits, condors; finally, there are the usual domestic animals, among them the innumerable quantities of dogs, small but vicious.

MOUNTAIN EXPLORATION IN NORTH-EAST GREENLAND

INTRODUCTION

By Dr. geol. Erdhart Fränkl

The exploration of Greenland has always been the ambition of all Europeans, especially Scandinavians. For a long time the west coast remained predominant, with its waters navigable throughout the summer months, enabling busy mercantile trade with Eskimo hunters. In contrast to this, the east coast with its savage mountains rises steeply out of the sea which is covered with ice-floes for hundreds of kilometres.

For this reason East Greenland was only comparatively recently visited by Europeans, and it was not until 1926 that a methodical scientific exploration of the fjord zone between Scoresby Sound and Hochstetter Cape was undertaken.

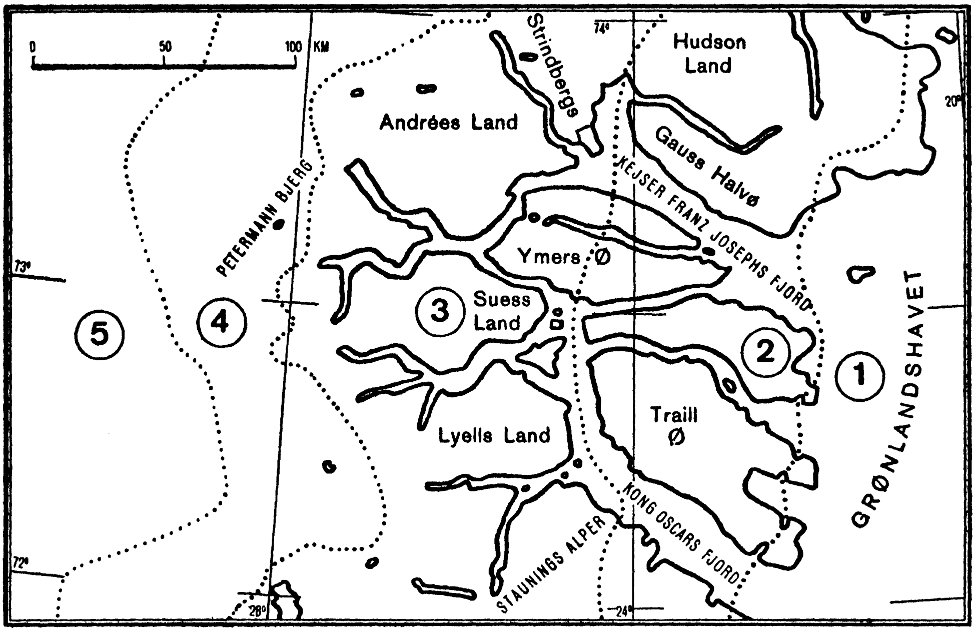
Dr. Lauge Koch led the Danish scientific expeditions in this isolated region of the Polar world, for many years with untiring energy. At first he explored North Greenland either alone or in company with Knud Rassmussen, but since 1926 he confined his activities to East Greenland.

Dr. Koch's expeditions dealt with geology, botany, zoology, archaeology and further with meteorology and ice conditions. At first, Danish and Swedish scientists headed by the leader of the expedition himself worked out the principal lines of investigation, upon the results of which a more detailed plan was built up.

Scientists from various countries were brought in to work out the details, including some from Switzerland. It was the task of the Swiss to penetrate into the interior of the country, where precipitous mountains abounded.

The terrain which was the object of research is defined as follows: South 72° latitude, north 74° latitude, east 20° longitude (the sea), west 32° longitude (the ice-cap).

The above territory is a land of mountains, the average height of which rises from 2900 ft. in the east to 8200 ft. in the west. Long fjords cut deeply into the mountains and split the country up into a mosaic of islands and peninsulas. Five parallel zones, all running roughly from north to south, extend from the east


0
50
100 KM
74°
73°
72°
28°
24°
20°
Hudson Land
Strindbergs Land
Andrées Land
Gauss Halvø
KEJSER FRANZ JOSEPHS FJORD
PETERMANN BJERG
Ymers Ø
Suess Land
Traill Ø
Lyells Land
KONG OSCARS FJORD
STAUNINGS ALPER
GRØNLANDSHAVET
①
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1. Coastline. 2. Other fjord zone. 3. Inner fjord zone. 4. Nunatak zone. 5. Ice-cap.

coast to the ice-cap in the west. These zones differ considerably from each other as regards climate, population, fauna, flora and geological structure.

Zones 1 and 2 present monotonous scenery; wide flat valleys, a breeding ground of innumerable mosquitos, penetrate a range of moderately high mountains and plateaux which drop gently to the coast and fjords. Both zones are largely built up of level sedimentary rocks, the age of which extends from the Devonian to the Tertiary era. The adjacent sea, with its constant belt of ice-floes, has an unfavourable effect upon the climate, characterised by foggy summers and copious winter snowfalls.

Zone 3 provides a complete contrast to the other zones, both as regards climate and scenery; mountains and high plateaux alternate from north to south. Mighty glaciers flow down the valleys and fjords and valleys are shut in by enormous cliffs. Gigantic ice-streams, emanating from the ice-cap, flow into the fjords at the boundary of Zone 3. The glaciers move forward at a relatively rapid rate, amounting in some cases to several metres per day, and their snouts, calving periodically, are swept out through the fjords into the sea as icebergs.

Zones 3 and 4 form an homogeneous geological unit. This area is a section of a large mountain chain, extending between latitudes 70° and 80° north along the east coast of Greenland. The alternating crystalline and sedimentary rocks of the massif range from the pre-Cambrian to the Devonian era.

The climate is dry on the whole, caused by a katabatic wind of a foehn nature, which blows with a moderate strength throughout the year from the ice-cap to the sea. This is due to the great difference in temperature between the 10,000 ft. high ice-cap of Central Greenland (average temperature –30° C.) and the warmer fjord region (average temperature –7° C.). This difference is particularly noticeable in spring and autumn when the katabatic winds attain gale force.

Zones 3 and 4 are similar as regards mountain formation and geological structure, but in Zone 4, on the other hand, there are to be found no fjords and almost no ice-free valleys. All the valleys and low-lying land are icebound, mostly by glaciers coming down from the ice-cap. Mountain peaks and solitary rocky emminences known as nunataks, project out of the ice and sometimes attain a height of from 7900 to 9500 ft.

Little is known about the climatic conditions of this zone. The katabatic wind also plays a part here and ensures a relatively dry and warm summer season.

Zone 5 is the ice-cap and is separated from the nunatak region by a deeply crevassed area, where crevasses of 50 m. and more in width are not uncommon. West of these crevasses the ice-cap rises gradually to a height of 10,150 ft. Temperatures down to –60° C., both in summer and winter, are the rule and violent storms are frequent, making exploration of the ice-cap an extremely strenuous venture even in summer.

ZOOLOGICAL SURVEY

By Dr. Fritz Schwarzenbach

We had frequent opportunity to come into contact with the fauna of the inland valleys. The *Musk Ox* abounds in large numbers in the deep valleys of the mountainous regions which adjoin the ice-cap. They are always on the move, as grazing is scarce and the tracks of their small herds are found everywhere. Almost every labouriously climbed summit was found to have already been visited by the ubiquitous musk ox and there were few scree slopes which did not carry a track, well-marked by tufts of white musk wool or strands of long coal-black hair. These animals kept cropping up in the most unexpected places. The heavy head, bearing curved lyre-shaped horns, has an impressive effect and the long shaggy top-coat, black above the white musk wool and reaching almost to the ground, increases the pre-historic aspect of these beasts. The short sturdy legs indicate the strength of the animal, and if one has ever seen an angry ox sharpening its horns on the ground prior to attacking another ox in the breeding season, one learns to respect these animals although they are scarcely as large as the Valais cattle. Although they appear dangerous, they are generally harmless. If they are frightened they almost invariably turn tail and stampede, cows and calves in front followed by the main herd with the leading bull as rearguard. They scramble nimbly and sure-footed over rocky slopes and ledges, until, at last the herd comes to rest and settles down to grazing once more. In the summer they feed heartily, for during the winter months they are obliged to rely upon their own fat and any sparse grazing available on snow-free patches.

The *Lemming* is a miniature marmot. Like its alpine cousin, it digs burrows into which it disappears when disturbed. These voracious rodents play havoc with all plant life in the neighbourhood and especially favour wild onion plants which they root out of the ground. The stalks and leaves are only bitten off but the onions themselves are devoured in no time. These little animals sleep through the winter months above ground in globular nests made of dried grass. They have many enemies and are continually hunted by the ermine and the arctic fox, not to mention the Islandic falcons, the white owl and the every-hungry gull. Consequently the lemming is extraordinarily timid, compared with the other animals of East Greenland.

The *Arctic Hare* inhabits the glacier regions. It is larger than its alpine cousin and is white in colour. They are very trusting and often let one approach to within a few metres, whereupon they sit up and hop away in an upright position like small kangaroos, without using the fore feet.

Arctic Foxes are trapped during the winter on the coast on account of their pelts, in the interior of the country they never come into contact with man. On occasion these long-legged, grey-brown (in summer) beasts used to steal meat out of the frying pan or play with an empty butter tin outside the tent at night.

It is a very delightful experience to see an *Ermine* using the tent as a gymnasium, climbing along the ridge pole with weasel-like agility or trying to hide a hare's pad under the stones.

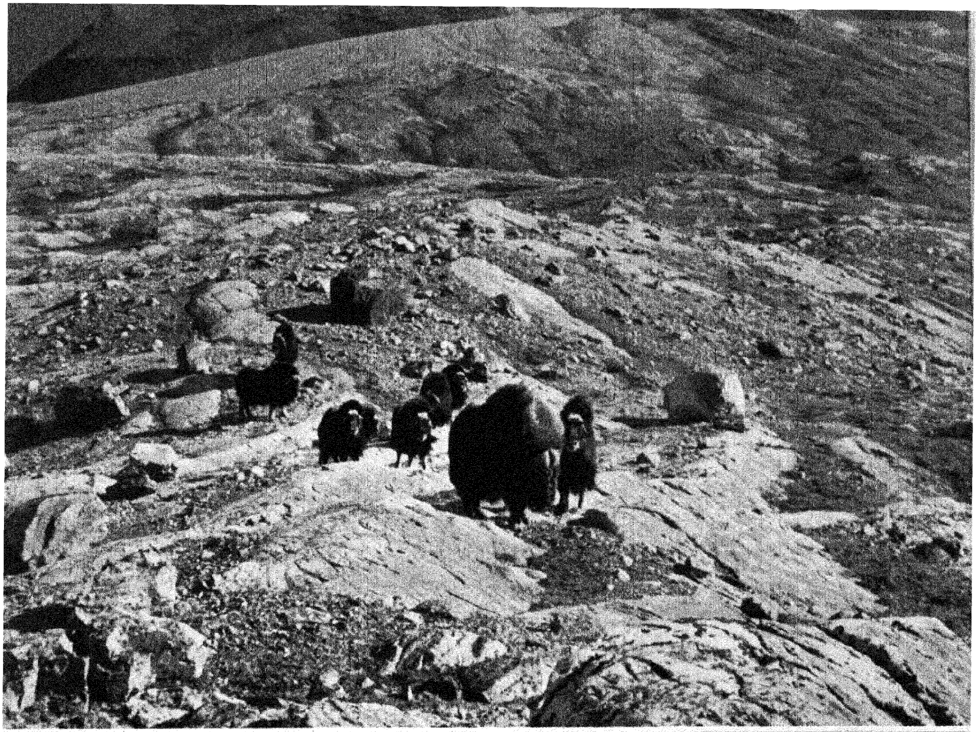
The bird fauna provides a very mixed bag. There are numbers of mountain birds, such as the *Snow Bunting*, living on seedlings, and the *Golden Plover* which preys on mosquito larvae. To see this small black and white bird running about between the plant stems, coming to a sudden halt, then shooting off at a tangent and then running on again, provides a most amusing diversion during long excursions. Greenland also has a large number of coast and sea birds, such as the large silver-white *Arctic Gull* or the *Sea Swallow* with its forked tail, red bill and legs and black head. Ducks are also numerous, like the *Arctic Duck* with its homely colouring or the *Eider Duck* which only breeds in a very few places. *Auks* are birds having a penetrating cry, an upward-slanting bill and providing meat which is as tough as leather to eat. There are large numbers of *Geese* to be found on the inland lakes where they live on mice and fall a ready prey to hunters.

In some seasons *White Grouse* are plentiful and in others almost non-existent, but up to now it has not been possible to find a reason for this disparity. Contrary to the habits of other birds, the white grouse spends the winter in Greenland, when it lives on buds which it finds under the snow.

There are few insects in Greenland, with the exception of the *Gnat* which makes life a torment in low-lying swampy regions until the first autumn frosts make a sudden end to these pests.

Plate 53 (top): Musk oxen in the Noa Dal (Ymers Ø). In the foreground an ox, characterised by its curved horns.

Plate 53 (bottom): Lemming in front of its burrow. This miniature marmot is about 8 cm. long and constitutes the principal food of the smaller beasts of prey of East Greenland.



SUMMER CLIMBS IN THE STAUNINGS RANGE

By Peter Braun

Our motor-boat *Polypen* was skillfully navigated through the Kong Oskar Fjord by Axel Jensen. Until a few days before, the numerous ice-floes had prevented any passage from Ella Island to the south. Erdhart Fränkl undertook the geological survey of North Scoresby Land, while Fritz Schwarzenbach and I planned to penetrate once more this summer (1951) into the Staunings Range and if possible do a little climbing.

We had very carefully arranged our equipment. Everything was carried personally in order that nothing should be left stuck in the pack-ice on the depot ship, as was the case last year. Numerous air photographs taken by the expedition showed us the practicable routes up the glaciers and the chances of climbing the highest summits of the Staunings Range. We had no qualms about the weather in Greenland.

On the 21st July we came ashore in the Segelsaellskapets Fjord, east of the mouth of the river which should lead us to Skjoldungebrae. Next morning Fritz and I started out, heavily laden with food for eighteen days. We found a good route along the moraine, but the glacier provided the best going. In five hours time we pitched our first camp on the left lateral moraine. A tributary glacier joined the main ice-stream just below this spot. It led right up to the wonderful snow-summit of Silberhorn. As the 23rd July was rainy and clouds hung low over the fjords, we postponed the start.

Axel had discovered a leak in the petrol tank of the motor-boat. This hurried up our plans and we rapidly stowed our equipment in the sacks and in half an hour we were on the way to the hunting depot at Cape Petersen. Axel landed us with all our equipment here and went on to Maria Island, where he intended to effect repairs to the *Polypen.*

A further surprise awaited us in the Norway Hut. Instead of finding a nice dry room, it was leaking like a sieve, streams of water poured through every crack in the roof on to the hearth, table and beds. We found some rolls of roofing felt outside and a prolonged search brought to light a hammer and some nails. We became so busy that we had no time to notice that the mist had lifted and the clouds dispersed until the hot sun suddenly came out. To the south we could see the snow-sprinkled peaks of the Syltoppene.

Plate 54 (top) : An arctic fox sniffing about for scraps.
Plate 54 (bottom) : Young golden plover.

Next day, under a cloudless sky, I went up to our depot on the Skjoldungebrae. At last we were able to get away from the coast on the 27th July. The route to the glacier rises slowly over marshy meadows to the edge of the narrow lateral moraine and is quite easy. We only took six hours to reach the camp-site.

The flat ice was covered with large pools of water and we were obliged to construct channels to drain the water away to find space for a tent. Eventually both tents were surrounded by a well designed system of canals, which well merited the name "Campo Venezia".

The shining névés of the Silberhorn gave prospects of wonderful summer ski-ing. Erdhart came along with us but unfortunately he had no skis with him. An hour later when we had attained a height of over 3000 ft. above the sea and left the open glacier for the upper névé, he went back.

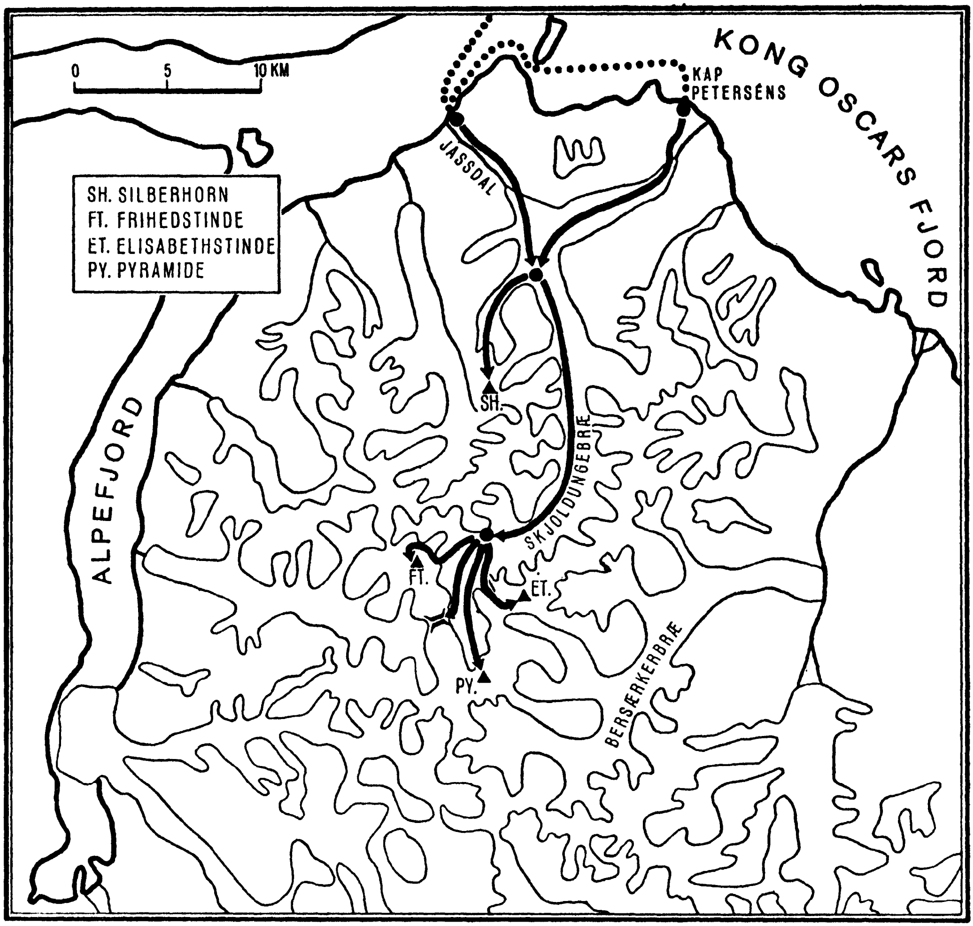
The many crevasses were easily visible and we both chose the same line of ascent, the steep slope forcing us to carry our skis up to the east arête. This snow-ridge led direct to the summit which we easily reached on skis, after passing over three minor peaks. The view from the arête and summit was magnificent, to the south we could see the highest peaks of the Staunings Range and to the north snow-plateaux stretched as far as the eye could see. The icebergs in the blue Kong Oskars Fjord looked like little sailing boats. The descent in excellent snow conditions gave us a taste of further joys to come.

Frihedstinde (8561 ft.)

Our depot at "Campo Venezia" had become very small, as Fritz and I carried heavy loads up to our future camp. To-day, on the 31st July, we reached the steep slope at the end of the open glacier and the going became laborious. The snow-covered glacier had become a real morass. On the occasion of our first climb up here, we had left two pairs of skis behind, Erdhart and Fritz now put them on and, being lightest, I followed on foot. It went better than expected, as the sky was cloudy and the sun was not able to soften the snow.

We pitched our camp on a scree-slope at 4030 ft. and constructed a level platform for sleeping. To-day was the 1st August and we had an important decision to make; it was our hope to find a pass leading over to the Vikingebrae. For hours we pored over the air photographs but there was no sign of a way over, although there appeared to be vague signs of a pass on the map.

We had a clear view of this alleged pass from the camp; 800 ft. of steep rocks, topped by a further 100–165 ft. of ice-cliff. Perhaps it might be possible to find a way over. We started off but it was not until two hours had elapsed and not thirty minutes as we had hoped, that we reached the initial rocks. The climbing was good, on sound firm granite, and two hours passed rapidly away. The ice-



KONG OSCARS FJORD
0
5
10 KM
KAP PETERSÉNS
JASSDAL
SH. SILBERHORN
FT. FRIHEDSTINDE
ET. ELISABETHSTINDE
PY. PYRAMIDE
SH.
SKJOLDUNGEBRÆ
ALPEFJORD
FT.
ET.
PY.
BERSÆRKERBRÆ

wall seemed to be almost within reach and I hoped to be able to tackle it after the next run-out, but it was separated from us by a deep gully. We were too late, Erdhart was waiting for us and we had to return. However we had seen enough to know that the crossing of the pass was possible, but not with all our equipment. In the meantime the weather had turned bad again, we were in thick mist and it began to snow, so we turned back to camp. Erdhart left us that evening and went to meet Axel at the mouth of the Jass Valley.

A mighty granite peak soaring above the Skjoldungebrae and Vikingebrae, rose straight out of the upper glacier basin. We had had our eye on this monster for some time, but the air photographs did not show any chinks in its armour.

We started out on the 2nd August under a cloudless sky. The route followed the northern branch of the Skjoldungebrae round to the north side of our mountain. We were held up for some time by wide crevasses, over which we passed sacks and skis on the rope. We then gained rapidly in height until the névés began to increase in steepness. From here there was a view down to the Vikingebrae, with ice-falls 1000 ft. in height.

We now saw the long couloir which should lead us up to the summit ridge, it was streaked by avalanches and we were obliged to abandon our skis. The ridge became rugged and steepened up, and giant cornices overhung the ice-cliffs.

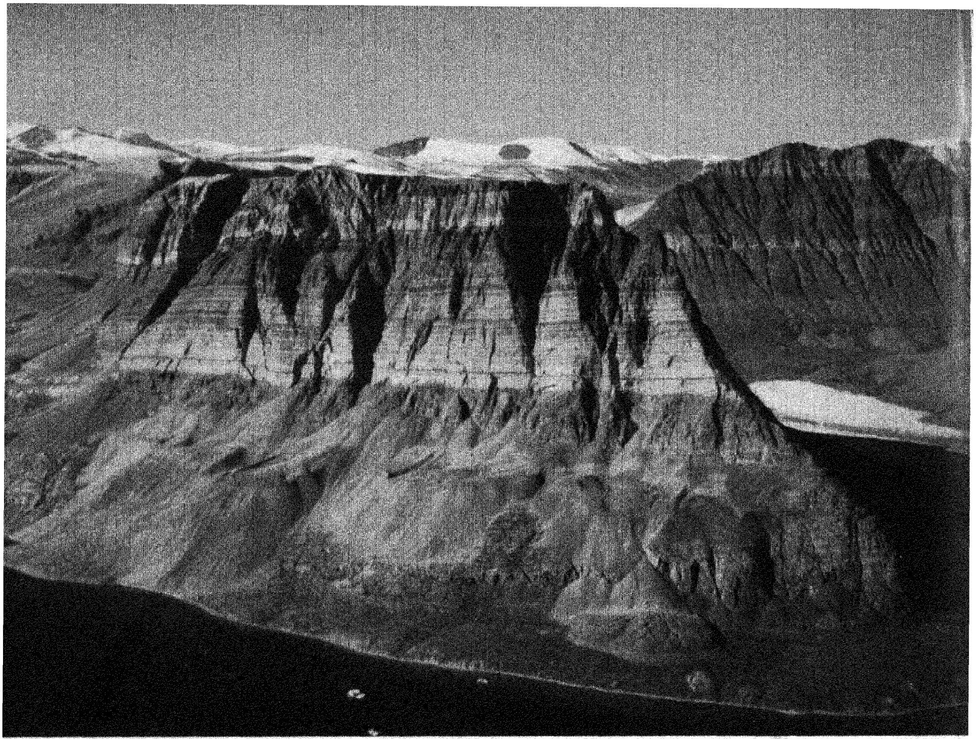
The snow remained in good condition and we had little recourse to the axe. This couloir, 1600 ft. in length and lying at an angle of 50°, seemed never ending and now the cornice projected like a roof over the top. Difficulties increased as the top part became steeper and more icy and very little help could be got for the crampons from the tiny cracks and holds on the rocks at the side of the gully. At last the final difficulty was overcome and we stepped out on to the summit arête. Far below lay our tent on the edge of the Skjoldungebrae and in the distance beyond innumerable un-named peaks, we could see the white pack-ice barrier which separates the coast of East Greenland from the open sea.

We took a short rest and then started on a chimney leading up through the last snow-covered rocks. We were obliged to climb in the shade; it got colder and soon our fingers were adhering to the steel axe heads. It was difficult climbing with crampons; another run-out and I was on top, close to the summit cornice. My hands were gradually getting dangerously white; I rubbed them vigorously with snow and then brought up Fritz. The aneroid registered 2610 m. The Frihedstinde was our first big peak in the Staunings Range.

In spite of the cold we hastily wrote our names and that of the mountain on a sheet of paper and left it in an empty sardine tin in a deep crack in the summit rocks. It only remained to take a few photographs and then to start down as fast as our stiffened limbs and my painful hands would allow. We went down the way we came up, very cautiously and belaying as much as possible. Some hot coffee at the ski dump revived our flagging spirits and we went on in good form. A pyramid on the south branch of the Skjoldungebrae shone red in the midnight sun. Tired but happy over our victory and our heads full of new plans, we at last reached the camp.

We were unable to stop thinking about the pyramid above the South Skjoldungebrae and decided to go for it on the 4th August. We made a bad start having overslept and did not get away until about midday. After three hours slow climb we reached the foot of the north face of the mountain. From close to the route through the ice-fall seemed easy and straightforward, but after the

Plate 55: The Frihetstinde (8563 ft.) from the north-west.
Plates 56–57: View from the west of the highest peaks of the Staunings Range.



first few yards we changed our minds. The ice-cliffs were practically vertical and frequently covered with hard frozen snow, making belaying difficult, step cutting took up a lot of time, but we gradually gained height. We were climbing in the shade with the temperature round about zero, after five hours we were 400 ft. above our skis. Ice-pitons would not stay in this frozen snow. Our feet began to freeze up and Fritz, as second man, had frequently to stand still for long periods in the steps. Cliff succeeded cliff and there appeared to be no end to them, so we decided to beat a retreat. At last we got a piton to hold and did a rapid abseil of 130 ft. In an hour's time we had reached safety and breathed again.

A very wide and steep snow-covered face rose up immediately in front of our camp, at the east end of which was the highest point, 7200 ft. Up to now we had not considered this peak, for the higher summits rising above the névés had claimed all our attention. But was we had a day to spare we decided to climb the Elisabethstinde (7400 ft.) as it was called.

On the 6th August, Fritz and I climbed a rocky ridge to the north-west arête. The ascent which was first over snow, followed by almost vertical rock, was not without difficulty, but there were good holds and the rock was dry. We were sorry to leave the ridge, for the north-west arête led straight up to a point close below the summit through deep snow. The arête became level once again and free from snow, affording good climbing, but we were still separated from the top by innumerable gendarmes. Steep as was the icy north face, the south face was even more impressive. We traversed one gendarme after another with a yawning abyss on either side. To the left stretched the seemingly endless Skjoldungebrae and on our right hand the Bersaerkerbrae. The sharp summit was uncomfortable, but we were able to find a nice place to sit and Fritz placed the usual sardine tin in a deep crack in the summit rocks.

We had barely time to enjoy the wonderful panorama to the full before it was time to think about going down. We had to put up with cold feet. We were not happy about the descent, would we be able to go down by the arête? We were kept very busy with the gendarmes from which we roped down, but could not just leave the rope hanging to secure our retreat. We considered descending the steep snow-covered north face, but in view of the possibility of stone fall and avalanches it could only be used as a last resource.

We began carefully to descend the series of chimneys leading to the summit. Our limbs were still stiff and our feet frozen and without feeling. There were very few holds but the gendarmes offered good facilities for belaying. We were able to turn the first difficult towers on the north side; deep snow lay in between

Plate 58 (top) : The "Teufelsschloss" (4391 ft.) on the Kejser Franz Josephs Fjord. View from the south-east taken in summer.

Plate 58 (bottom) : Heavy going through the gorge of the Grejsdalen River.

the rocks. The sun was now sinking and no longer warmed us, but we were nevertheless very glad to get out of the shade into its weak rays. We changed over from the cold north face to a few airy traverses in the south flank. Some gendarmes could not be turned but we were always able to find a weak spot. The tension had relaxed somewhat and we made it a point of honour to climb over the pinnacles wherever possible.

The rock-ridge gradually petered out into a broad snow-saddle and we tried to descend the steep névé to the left but the soft snow soon gave place to ice, below which yawned the wide bergschrund. I cut out a good stance and let Fritz down on the rope to the edge of the schrund. We were very tired but did not wish to lose any time, so Fritz jumped and pulling the rope slings out of my hand landed up to his shoulders in the wet snow below the schrund. The rope was tight between us, a foot or so more and I should have been pulled out of my steps. I was obliged to cut a few steps before I attempted the jump. In the meantime Fritz was clambering out of his snow bath. I chose a bad spot, landing on hard ice before falling head first into soft snow.

We waded laboriously through snow reaching up to our waists. The last rays of the setting sun were bathing the summits in a red glow. When we reached the camp it was past midnight. We had saved up our last tins of fruit for to-day and never did peaches taste better! The last remaining drops of petrol just sufficed to cook our well earned supper.

A large stone underneath the tent had become displaced due to thawing, leaving a deep hole on my side and other stones seemed to have moved as well, even my air mattress was no longer a protection. It was high time to strike camp.

We started back on the 7th August with 40 km. to go before reaching the fjord. Our sacks were very heavy and Fritz was carrying at least 60 kg. We went slowly to start with cursing the many crevasses which we were scarcely able to cross with our heavy loads. The going was better down the middle of the glacier and only a few small streams and pools of water caused any difficulty.

It was a monotonous journey and we were forced to rest for ten minutes every fifty minutes, later on this period was reduced to forty minutes with a longer rest. We found Erdhart's dump at the old camp-site, he had left a note to say that he had passed through. He had left a tent behind which we could not carry with us but would fetch later on. The moraines in the Jass Valley were heavy going but at last we reached the shore where we found a box of food and letters from home left by Erdhart, which were very welcome. We chatted for some time and regaled ourselves with fruit juice and tinned pineapples. My aching muscles made me think of the dissecting room at home.

Next morning we were awakened by the sound of an engine, far away to the west coming into the fjord we could see the motor-boat with Axel and Erdhart on board. They had looked for un in vain yesterday on the Vikingebrae so they came to meet us to-day as arranged in the Jass Valley. As soon as we got on board we felt that we had returned to civilisation, for the first time for three weeks soap and flannel would reign supreme!

THE CROSSING OF ANDRÉES LAND

By Dr. geol. John Haller

We had been travelling with the dog-sledges for about a month along the Isfjord, a tributary of the Kejser Franz Josephs Fjord and now my Greenland companion, Kristian Kunak, and I returned for a two day visit to the base camp on Ella Island. There was much to tell. Our Danish radio operator, Aage Barsted, had made a sledge trip to Myggbukta and Lochfine. There he met two Danish trappers who were in a desparate state, for three days they had been sleeping with guns ready to hand, united by fate under the communal roof of their small trappers' hut. They hated each other like poison and maintained a menacing silence. It was a bad case of "Polar nerves", brought on by an argument concerning the rise in price of strawberries last summer in Denmark!

We had news of polar bears and musk oxen, also of a bad rock fall which nearly buried us together with dogs and sledge.

The island seemed to me to be the very acme of civilisation, for once again we had a chance to wash and take a bath in an old tin tub. When one has to melt every drop of water from ice or snow over the primus while travelling, one is forced to neglect both personal hygiene and dish washing. Even my 8 cm. long beard gradually succumbed to persuasion.

The sledge trio to Ragnhilds Hut

On the 26th April 1950, we were once again en route to our field of activity. Our sledge was pratically empty as I had dumped most of the equipment with the motor-boat the previous autumn. Our seven dogs trotted along in high spirits and full of zeal through the Antarctic Sound. Thanks to favourable weather and good ice conditions we made very rapid progress and in eight hours time reached Cape Mohn, 60 km. distant, at the north entrance to the Antarctic Sound. After a long rest we went on for a further five hours along the Kejser Franz Josephs Fjord to the Blomsterbugten. Here there was a small Norwegian trappers' hut, which was outstanding both as regards position and equipment.

Immediately opposite the sunny slopes in front of the hut, soared the imposing "Teufelsschloss."

The next day we crossed the Kejser Franz Josephs Fjord and arrived at Ragnhilds Hut at the mouth of the Grejsdalen. This small hut covered with roofing felt stands on a sheltered part of the shore. The sunny and mild position had attracted human beings to this spot in olden times. Ruins of houses, graves and remains of primitive tools made of stone and bone provided evidence of the presence of Eskimos during the last century. They did not leave until forced to do so when reindeer became extinct on the east coast of Greenland.

The eating of raw reindeer meat is still remembered by the Eskimos as the following incident will show: I had cached the bodies of some seals we had killed for dog food under a heap of stones alongside our food and fuel dump at the mouth of the Grejsdalen. With obvious pleasure, Kristian went to the meat dump and stuffed a large piece of stinking flesh into his mouth before he fed the dogs. He offered some to me but I preferred the Danish tinned ham!

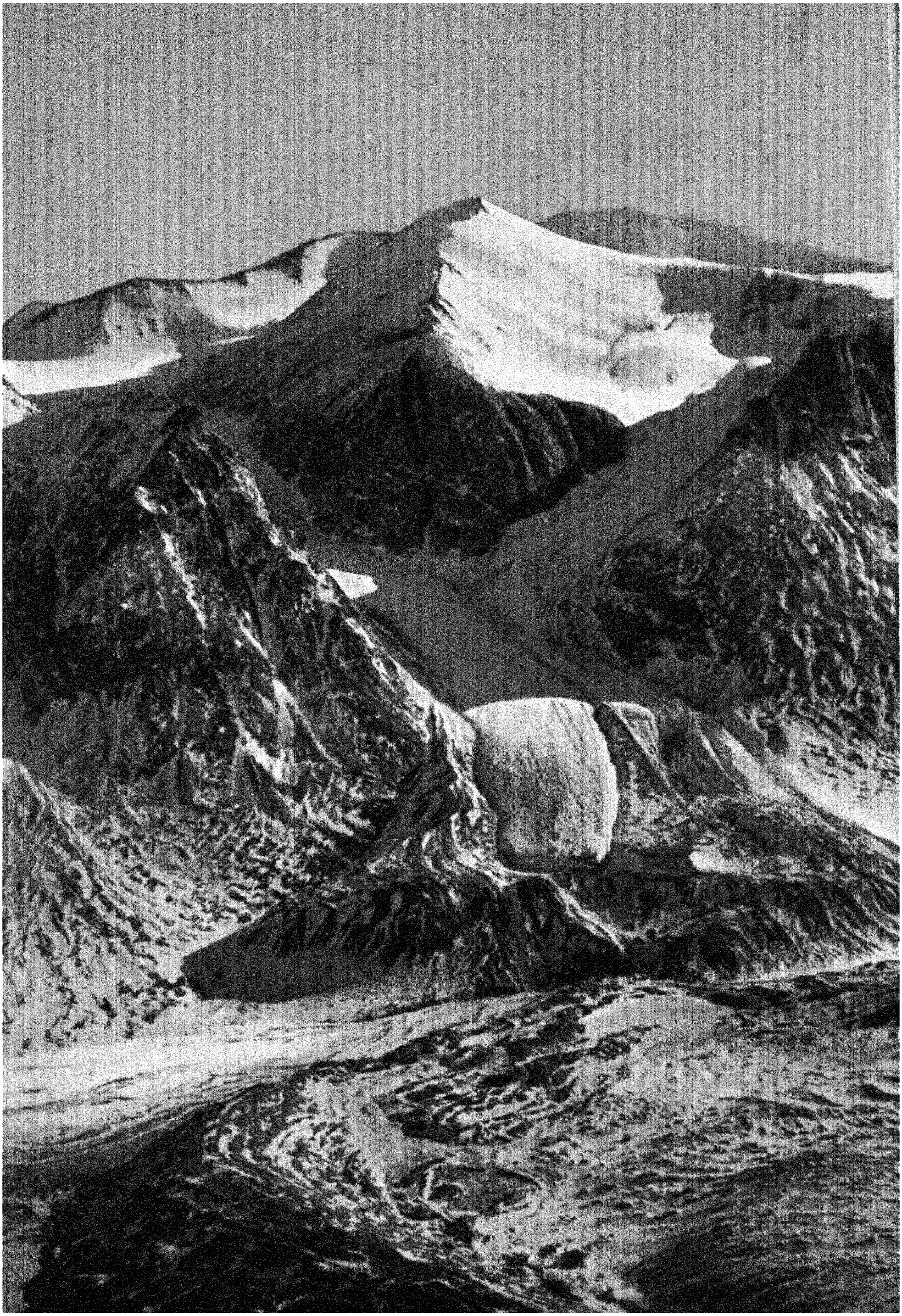
We now got ready for the crossing of Andrées Land. As I had to be prepared for a three week's journey, we were obliged to take food and fuel for this period with us. We intended to be dependant on hunting for the entire supply of dog food, as our sledge could only carry a limited supply of food apart from tent, fuel and some essential equipment. We had therefore to be content principally with oatmeal, butter, salt, sugar, tea, chocolate and a little bread.

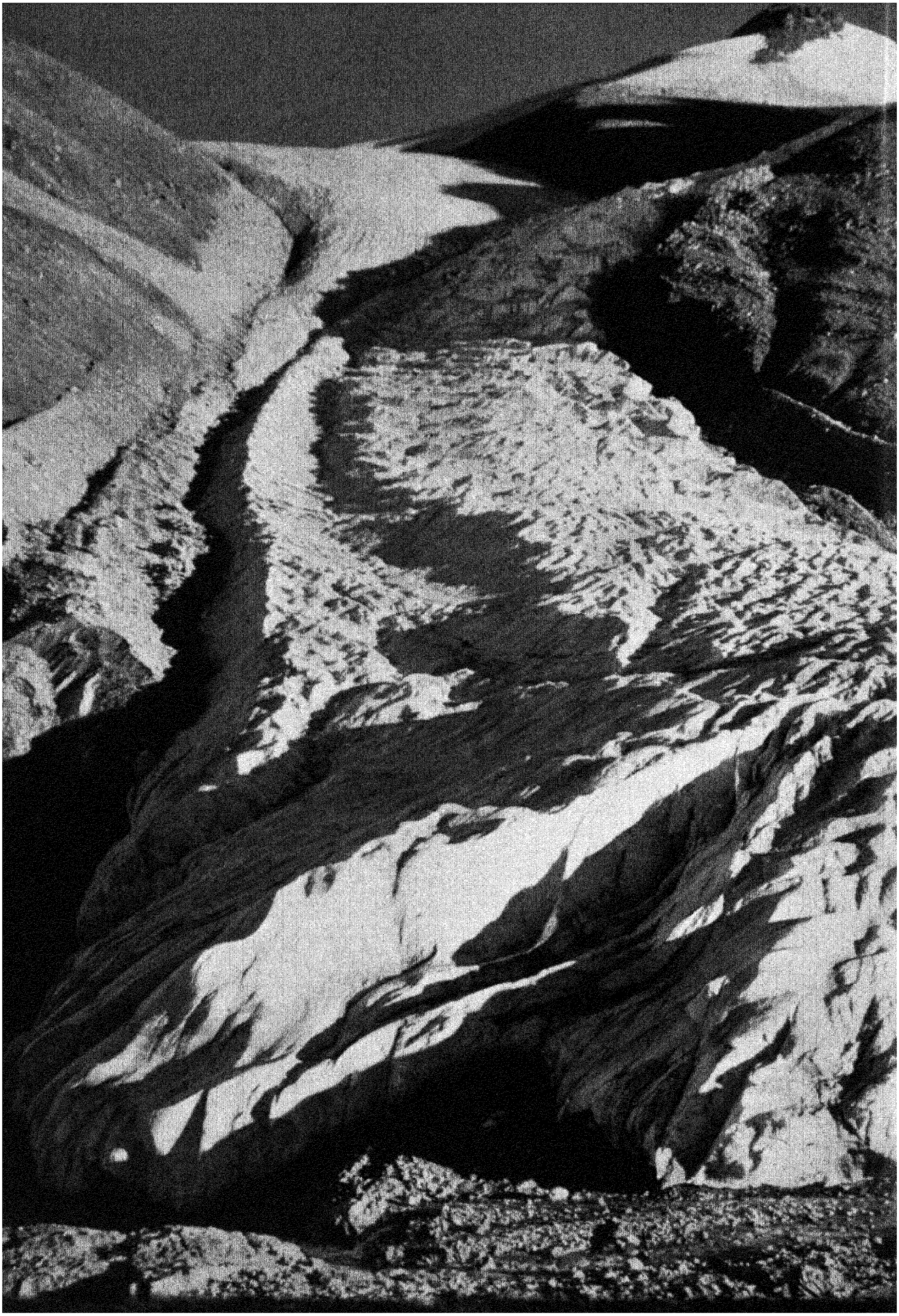
Sledge trips and climbs in the Grejsdalen

Our first attempt to penetrate the Grejsdalen was a dismal failure, as the river upon whose frozen surface we were travelling gradually led us into a deep and rugged gorge. We finally came up against a frozen waterfall 10 m. in height and were forced to beat a retreat. Kristian wanted to give up altogether and it was only his pride as an East Greenlander that prevented him doing so, because Erdhart Fränkl with Pavia Olsen, a West Greenlander, had been in this valley a year ago. What I did not tell him was that the other two were there in summer and without a sledge.

The next day we made good progress on terraced ground on the right side of the valley. We encountered large stretches completely free from snow and had to lend a hand with the sledge and occasionally carry boxes and petrol cans. After 8 km. the Grejsdalen takes a right angled bend to the west. The floor of the valley at this spot was about 300 m. high and the river was no longer enclosed in a gorge, so that we were able to make rapid progress on the "ice-road". From

Plate 59: Moraines of tributary glaciers in the middle Grejsdalen (May 1950).





time to time, small rapids made heavy going with our heavily laden sledges, but we now had snow and ice under the runners and no longer moraine and scree as was the case lower down the valley. Above the height of 400 m. the Grejsdalen is U-shaped with steep-flanked mountains of over 2000 m. on either side. We pitched our tent in the midst of a group of rugged granite peaks, 30 km. from the mouth of the valley. A large mass of granite is here situated, quite out of place, among the sedimentary rocks of the Eleonore Bay formation.

In the course of examination of this granite block, I did some climbing on a peak in the middle of the massif in beautiful weather, which is usual in the month of May in North-East Greenland. When climbing this smooth rock, the student of petrology is able, so to speak, to kill two birds with one stone. The rock holds indicate its composition and at the same time enables him to gain height rapidly and obtain an insight into and survey of his sphere of activity.

From the top, I had an excellent view of the large pinnacles on the opposite of the valley. Particularly imposing were the Orgelhörner with their fabulous hanging glaciers and savage ice-falls. The enormous moraines of the far advanced tributary glaciers looked like artificial dams in the distance. The terminal moraine of the large Fanger Glacier pealed off the whole floor of the valley. As it was my intention the next day to move my camp further up the valley, I searched with the field-glasses for a way for the dog-sledge over the wall of detritus.

In the end the moraine turned out to be quite innocuous, for a narrow gap remained open, providing a rather toilsome passage for the sledge. On the other hand, the upper Grejsdalen presented greater difficulty, for the valley floor was covered with 3 ft. of crystalline snow, the crusted surface of which continually broke through.

Compared to the Alps, the snow conditions here are peculiar. The remarkably small annual precipitation of from 30–70 cm. (12–28 in.) has an important effect upon the development of the snow cover in Greenland, as has also the foehn wind, often rising to hurricane force, which causes the snow to pack and consolidate. On the other hand, the permanent ground frost hinders continuous transformation of the snow from top to bottom, as is the case in the Alps. At 2600 ft. in the upper Grejsdalen, I was able to take some interesting measurements in this connection. The nights, although no longer dark, were still very cold and temperatures of –20° C. were normal. During the day, on the other hand, the air temperature rose to about zero and on the 5th May, even up to +5° C. On this warm day a temperature inversion, characteristic of arctic spring conditions, was observed in the 60 cm. thick snow cover, the temperature at the surface of the snow being 0° C. and –12° C. at ground level.

Plate 60: Port Glacier in the middle Knaekdalen (July 1951).

Our new camp was located at the foot of Mount Inka, an imposing peak situated between the Grejsdalen and Gneisdalen running off to the north-west. At this spot the sedimentary structure of the Eleonore Bay formation gave way to the crystalline. I had now reached my sphere of activity.

Climbs in the Gneisdal and upper Kalvedal

While Kristian was hunting musk oxen to supplement our food and that of the dogs, I climbed the 6500 ft. high Inka mountain. In spite of bad weather (the sky had meanwhile become overcast and it had begun to snow slightly), I had an excellent view down into the west entrance of the Djaevleklöften. We were to go through this a week later on the way to the Rendalen. However, I was mainly interesded in the Gneisdal.

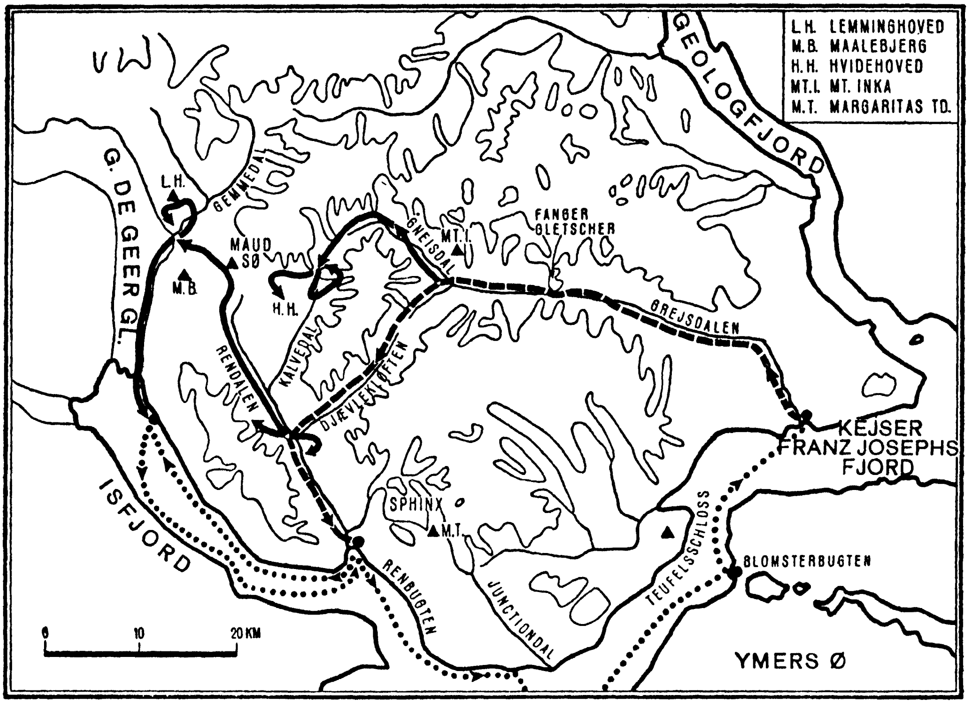
Apart from the bad weather I had two further instances of bad luck, firstly the haft of my hammer split while breaking stones and secondly, the Greenlander told me in camp that evening that he was not going any further and that was final! The broken hammer haft was easily repaired with a binding of cord, using burnt honey as glue but the storm raised by the Greenlander remained in the background and did not burst until next day as we were about to start for the unknown interior. A violent argument in Eskimo broke out, in the course of which Kristian pointed out the futility of my crazy work in this dangerous world of mountains.

As far as I could understand he was furious because to-day the 5th May was V-Day and at this hour in Scoresby Sound, he, Kristian, the pride of the valley, was mucking about with a dog-sledge on rock and snow-free ground instead of dancing!

Much later when we were safely back from the journey, I learned that the real reason for his pig-headedness was that he was terribly afraid of the narrow uncanny valleys which he imagined peopled with ghosts and evil spirits!

However, to return to our journey into the Gneisdal. After considerable labour we reached the spot where the Gneisdal makes a right-angled bend to the west and narrows down. I resolved to make a base camp here and leave Kristian with tent, dogs and sledge, while I pushed forward alone with a sleeping-bag and meta cooker.

The way led through a very narrow valley with high mountain walls on either side, over 3000 ft. high, from which stone, snow and ice-avalanches constantly poured down. The valley was sealed off by a vast glacier tongue with perpendicular ice-falls and huge crevasses. The geological conditions obtaining in this wild and romantic region were of extraordinary interest. The hours flew by unnoticed while I was busily engaged in following up the rock strata and taking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geological specimens, and I climbed higher and higher up the large glacier and finally arrived in a wide and beautifully situated upper valley.

This spot, between the Gneisdal and Kalvedal (Calves' Valley), 4600 ft. above sea level, provides several small grazing grounds for musk oxen amid glaciers and moraine slopes. I made a bivouac in the shelter of a large rock, cooked myself some porridge and got into my sleeping-bag. I was awakened after a few hours by a muffled rumbling. I peeped out through the slit in my bag and saw, to my consternation, that I was in the centre of a herd of peacefully grazing musk oxen. Up to now the large quadrupeds had apparently taken my blue sleeping-bag for some sort of unusual stone. However, now seeing it move, they all stood transfixed and stared at me. In order to get out of an awkward situation, I pretended to be a ghost... I raised myself and made a noise like a fog horn in the cold morning air. Whether it was this or the sight of a man half drunk with sleep and wearing long white pants, I do not know, but at all events the herd took fright and ran as if the devil was after it!

Another fine morning; a few cirrus clouds were visible in the deep blue sky and the sun was already high. I utilised this day for climbing the huge glacier-covered mountain massif lying between the Kalvedal and Rendal. After ascending a steep rock wall which formed a barrier at the end of the upper valley, I arrived at a col from whence could be seen the first summits of Louise Boyds Land and the large extent of the ice-cap. A further climb led me to a 6500 ft. peak, which dropped steeply to the Rendal and afforded me an excellent insight into the geological conditions of North-West Andrées Land.

There was pratically no wind and the air temperature in the sun was a few degrees above zero. I enjoyed the magnificent panorama and in particular I was fascinated by the spectacle of the Gerard de Geer Glacier which advances as a gigantic ice-stream between Andrées Land and Louise Boyds Land towards the Isfjord. With the aid of my field-glasses I was able to see far into the inner recesses of the ice-cap with its marginal array of nunataks.

On the way back to my bivouac, I encountered a large glacier tongue, with huge icicles depending from its perpendicular and in places overhanging ice-wall over 60 ft. high. The warm weather had already begun to melt the ice and the water trickling from these icicles provided a beautiful display of colour in the bright sunlight. This was the first running water which I had seen since the beginning of the long polar winter.

After another bivouac I returned to the base camp, the weather deteriorated and it began to snow slightly. I descended the well known glacier down into the narrow valley. Apart from the light sough of the wind and the monotonous sound of the snow on my anorak, everything was still. Suddenly I became aware of another sound, it was a sort of whining noise, which penetrated the swathes of mist and was echoed from the mountain walls. Sometimes it was like music, such as the uncanny tones of a musical saw. I was intrigued and sat down to listen. Judging from the many fresh tracks in the snow I am of opinion that it was the white and blue foxes who were giving me an early morning concert.

Djaevleklöften and Rendalen

During the next few days we traversed the deeply cut Djaevleklöften, much snow was lying on the floor of the narrow valley but it was frozen hard and compressed by the wind, so that progress on foot was rapid. After spending a few cold nights in this sheltered valley, we at last reached the wide flat Rendalen.

This is a characteristic foehn valley, last autumn I experienced a severe sandstorm here, so we took the precaution of pitching our tent in as sheltered a spot as possible. The warm weather of the last few days had melted nearly all the snow; even when the sun sank quite low, the river in this valley barely froze during the night and only the neighbouring Margarita Lake was covered with thick ice. I did some mountain exploration of great importance for my geological work in the massif lying between the west end of the Djaevleklöften and the Kalvedal, as well as in the La Croix Range.

Kristian was working on the calendar and suddenly annouced that it was Sunday the 14th May. My thoughts flew at once to my own country; there the trees would be in blossom, everywhere flowers, sweet smelling woods, singing birds, the cry of the cuckoo. Filled with longing for all the beauty so far away, I lay in my tent amidst a depressing desert of snow, stones and sand. Here only the howling of the dogs was to be heard and occasionally the twittering of a pair of snow-buntings. For some days past, large numbers of great green flies had been buzzing around our tent.

Bivouacs in the Gemmedal and ascent of Lemminghovet

In view of the unfavourable snow conditions in the Rendalen, I decided to send Kristian back alone to Renbugten with the sledge. Having arrived there, he was to go on to the end of the fjord and wait for me at the outlet of the Gerard de Geer Glacier.

I now began a long and toilsome journey into the north-west corner of Andrées Land, equipped with food for several days, sleeping-bag, compass, hammer and camera.

I camped in a small gorge in the upper Rendalen; on my way to Maud Lake I unexpectedly came upon a sleeping musk ox family. They were basking in the sun and were almost too lazy to take any notice of me. On the descent to the Gemmedal, the foehn wind started up, blowing straight towards me at a force of from 6 to 8, without ceasing. I built a stone wall at the edge of the Gerard de Geer Glacier in order to get some protection against this devilish wind, but it was no use, it continued to blow, howling and roaring through the valley. At the same time it sent fine mica dust sweeping along before it, which penetrated every crack. I was very tired but was unable to sleep, for this vile wind shook and rattled the cover of my sleeping-bag and the midnight sun shone golden over the endless white of the ice-cap.

Next day I worked in the gorge of the lower Gemmedal and then climbed to the 4600-ft. summit of the Lemminghovet. I had a wonderful panorama from this peak; immediately below me was the very crevassed Gerard de Geer Glacier. To the south, the Isfjord looked like a large patch of snow, and opposite me to the west rose the impressive mountains of Louise Boyds Land, especially the Aletschhorn with its precipice down to the ice-cap. The devilish storm was still raging all day.

The geological work in this remote region was very strenuous and demanded complete concentration. My role here was not that of a tourist, with a few mountains to climb, but that of a stone breaker, and at the end of the trip I would have to compile a coherent and comprehensive geological map.

From Mallebjerg to Isfjord

After a further bivouac near the outlet of the Gemmedal, I made my way down to the Isfjord. Had I known what lay before me in the next 18 hours, I would rather have taken the 28-mile route through the easily traversed Rendalen to Renbugten, instead of the 9½-mile stretch from here along the ice-cap glacier to the Isfjord. I knew the lower part of the route well from my first sledge trip in April, from the Isfjord a little way up the Gerard de Geer Glacier, but did not know how conditions might have changed since then.

The Gerard de Geer Glacier is one of the largest, flowing from the Greenland ice-cap to the Kejser Franz Josephs Fjord. It is completely cut up with crevasses in the nunatak zone, over 30 miles above its tongue. The compact mass of ice gradually breaks up into a stream of large blocks of anything up to the size of a house, all in continual motion. Such ice-cap glaciers advance from 30 to 100 ft. *per diem.*

I was able to pass by the north-west foot of Mallebjerg and made some interesting geological observations, providing a pleasant diversion. Now, however, began the difficulties; along the steep west side of Mallebjerg enormous masses of ice pressed close to the rock wall at this spot and dammed the flowing melt water into lakes of all sizes. It was not possible to climb over the almost vertical rocks, so that I was forced out on to the crevassed and continually moving ice. It was not until now that I realised how much ice and snow conditions had changed on this sunny west face of Mallebjerg; there were kales now where a month ago had been easy snow-slopes.

I was exhausted by the tedious route and the weight of my sack full of stones and was glad to reach the Isfjord. Here spring had arrived, especially at the sunny north-east end where protected from the wind was a summer ice-beach. The water gurgled between the glittering slabs of pancake ice in the fjord and I was reminded of a summer meadow back home, where insects chirped.

Far out in the fjord, large sections of the ice were already covered with pools of melt water. This rather alarmed me as I wondered whether Kristian had been able to get this far with the sledge. However, he was there exactly at the prearranged meeting place. He was very pleased to see me again alive and well; he liked being down on the fjord again and much regretted that we were not going seal hunting instead of digging stones out of mountains!

My main task, the traverse of Andrées Land and the making of a geological map, was achieved.

JOURNEYS INTO THE NUNATAK ZONE

By Dr. med. Hans Peter Buess

The foreground

Wenk and I started out towards the mountains heavily laden. We came from the fjord and it was our intention to carry the remaining equipment up to the advanced high camp. The other two, the geologists, were already there and were expecting us during the night. This was the first stage of our march into the interior; we knew the way and recognised all its mischievous tricks and exhausting passages. From the sea the way led through the deep trough of a gradually ascending valley marked on our map as the Knaekdalen.

This map had its own peculiar charm—it cheated! Its inclination to prepare surprises for us, by means of a sort of careless rapture where topography was concerned, was only too obvious. However, nobody thought any the worse of it for that. It suited our zest for improvisation in our present way of living. Greenland has its own standards on an exceptionally large scale, which goes for mountains and ice, men and animals, in fact, everything. Two or three glaciers too many, a mountain too few, what does it matter, why should a map be more popish that the Pope?

In the first place we had no need to consult it at all, we knew all the scree-slopes, terraces and dry gulleys of this lower section of the valley, only too well. We had to spend the last few days bringing up our voluminous equipment past all these obstacles, but our ascent to-day to camp II would see the end of this 12 km. stage. Our trip would last about four weeks, there were four of us, all with appetites, so that we needed food, fuel, beds, etc., to be able to exist and work for this period completely independant of the arctic alpine conditions. Even the natives avoid these latitudes on the cold north-east coast, and the most northerly eskimo family, cooking its blubber soup, was about 200 miles south of our present position.

We stopped for a rest and a cigarette; our sacks were heavy and it was hours since we had set out. The valley was pretty and well graded, dotted with brown-green vegetation and bounded by high cliffs; far away lay the blue fjord covered with ice. The sun was setting and its rays fell obliquely on the floating ice-masses, which half-mountain, half-monster, drifted towards the sea on the winding waters of the Kejser Franz Josephs Fjord. There was the Nordenskiöld Glacier, whose broken tongue fell steeply into the fjord, bringing the silence of the ice-cap into more southerly seas.

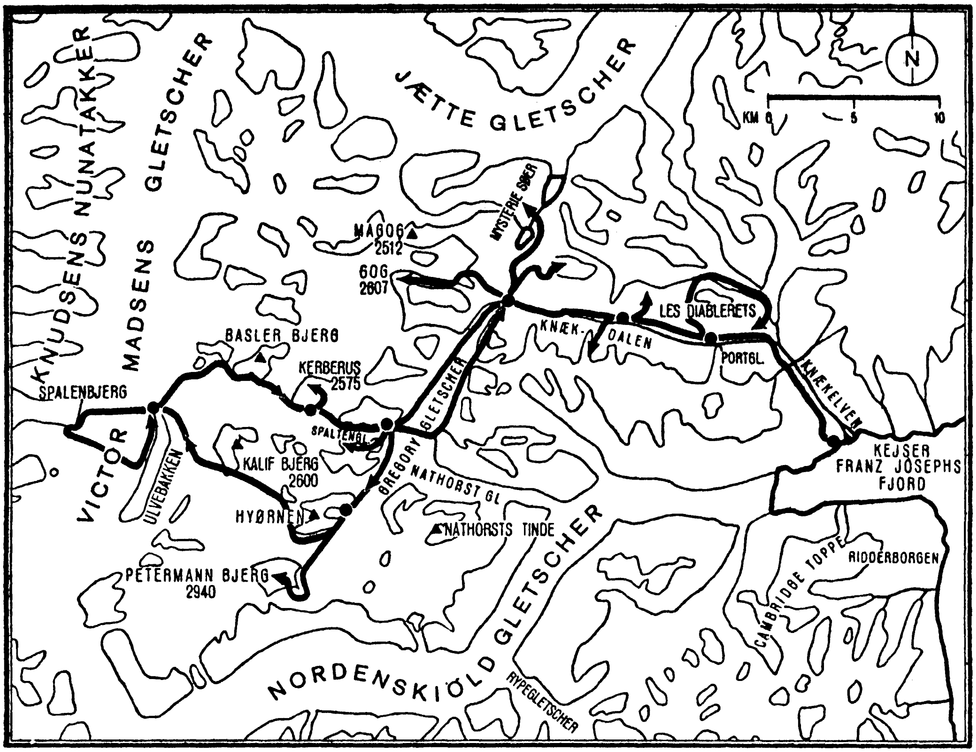
Not far away, our valley spread its stony delta in the sea, and somewhere down there lay our small forsaken base camp with its sleeping and mess tents and everything else we should have to do without for the next few weeks. It was to be hoped that the white polar bear, which we had not seen up to now, would leave the camp alone, in spite of its proverbial curiosity.

The motor-boat which had brought us here was named *Sabine* and we had complete confidence in it and its Danish owner, Povel Povelsen. He was responsible for maintaining the somewhat intermittent and occasionally entirely disconnected communications between us and our main camp, about 65 miles distant, on Maria and Ella Island in the outer fjord. He acted as a sort of expedition newspaper and made it his business to circulate extensive gossip in amazingly good German from fjord to fjord and camp to camp. Greenland is an ideal and fruitfull soil for rumours, stories, false and premature death announcements and the like, for in its wide spaces phantasy plays a large role.

Povel's assistant was a young Greenlander who had given himself the christian name of Hans and was the proud possessor of a notable rifle, with which he put to flight the seals and was a constant source of danger to the boats crew. These three "trustys", the *Sabine* and her crew, were to return later in order to pick up the mountain-crazy Swiss, as Povelsen called us.

But to get on with the story: we took up our loads, swung them on our shoulders and set off. Small well-beaten tracks led obliquely up the scree of the moraine, but there was no sight of musk oxen which had regularly passed this way and, to judge by the dried manure, fairly recently. Lower down the fjord, just below our camp-site, there was a veritable open-air dance floor on the flat terraced shore, simply covered with the hoof marks of these large beasts. They must have gone over the frozen fjord to other pastures during last winter or the winter before.

We had now reached the critical point of this stage of the journey, the valley turned westwards and the silent fjord disappeared from view. The Knaekelven narrowed to a deep rock and moraine gorge, and rushed rapidly down the valley. We had to cross it and here was the best place. After divesting ourselves of the lower part of our clothing, the first aspirant entered the racing current. The sight of an oscillating mountain of luggage supported by a half naked human form, which advanced doggedly and with much cursing through the icy water, was a matter for mirth and provided the non-participant with an excellent opportunity to make uncalled-for remarks—until it came to his turn—then the joke was on him. Yesterday Goetz had lost his footing and was swept over a small waterfall. We were 73° N. and my expert opinion, as medical officer of the party, that a cold bath keeps one young, should have been of comfort to him. But, such is the way of human nature, he was barely restrained from throwing me in as well and he is a very strong man!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SPALTENGL.
KALIF BJERG
2600
HYØRNEN
PETERMANN BJERG
2940
GREGORY GLETSCHER
NATHORST GL
NATHORSTS TINDE
KNÆK-DALEN
LES DIABLERETS
PORTGL.
KNÆKELVEN
KEJSER FRANZ JOSEPHS FJORD
RIDDERBORGEN
CAMBRIDGE TOPPE
NORDENSKIÖLD GLETSCHER
RYPEGLETSCHER

Arrived at the opposite side, we gained rapidly in height; the gorge was behind us and we hurried on so as to get some warmth back into our half-frozen limbs. The face of the landscape changed; the Knaekdalen had become a mountain valley and stretched out before us in between high rock walls, finally terminating in a distant mountain chain. The beautiful and clearly delineated silhouette of the Gog rising from it, shone in the night sunshine. Behind it, unseen, lay the incalculable ice-cap; over there in the depht of the valley must lie the magic door which would give us access to a strange world and in which stood a majestic mountain, the Petermann-Spitze.

We were approaching a narrow and steep glacier; it came down from the mountains through a restricted valley and spread itself out at the bottom. Our stream had undermined one of its claw-like ice-ribbons and had there formed a shimmering blue bridge. We knew that our camp lay on the bank of one of two moraine lakes which lay in the general direction of the continuation of the ice-stream.

At last we were there and Goetz welcomed us with bloodstained hands and a dripping knife. Wenk asked dryly whether he proposed serving up Haller for supper, one had heard of such things before now, as a result of polar nerves!

But the gloomy foreboding was dispelled by a cheery grunt from the tent, there was moreover an agreeable smell in the air. Our tent was pitched there as well, and a sharp wind was blowing from the ice-cap, a sign of continuing good weather.

We dined with the geologists on arctic hare and rice. It was past midnight as we squatted together round the primus and a feeling of well-being was predominant as everyone silently chewed the cud.

"How prudent is Nature", remarked someone. Everybody sat up and waited for the coming words of wisdom. "How prudent is Nature", once again we waited and the tension grew!

"When one thinks how like velvet is the fur of the arctic hare and yet how devilish tough is its meat." The speaker had to take cover as a half-gnawed bone, accompanied by an imprecation, flew across the tent.

We were in first rate spirits, we were in Greenland and we were our own masters. The normal good or bad world lay on another far-off and almost unreal planet. We forgot sleep for the night had deserted us in this peculiar land and nattered on this and that, the Creator, the origin of the Universe and the sedimentary deposits of Greenland and in particular their tectonic thrusts.

The influence of the last few million years inspired the geologists to a comprehensive discussion in their own technical jargon. Just before dawn, we got into our sleeping-bags with the intention of sleeping through that day and the following night.

Camp IV was situated at the furthest point of the Knaekdalen, a little below the Gregory Glacier, which advanced from the south into our valley with its wide bulging tongue. The Knaekelven meandered from the glacier between soft blue-green banks of sand, overgrown with brown marshy polar grass. Its banks were covered with the graceful silver heads of cotton grass.

We loved this valley with its clear colour, the abrupt flanking walls, hanging glaciers and its animals, plants and stones. There were the comical arctic hares which appeared at night in droves and peeped inquisitively from between the rocks. It was a remarkable sight to watch them running away for long distances on their hind legs, for all the world like the Easter hares of the picture books. Then there was an arctic fox which had more taste for Danish chocolate than we had and almost fed out of our hands. An ermine also visited us, a small and savage animal with wonderful eyes, full of courage and zeal to attack. It fought with me for an open tin of best tunny fish and bit me in the hand in the course of the argument.

Then there was the simple but beautiful plant world, the delicate rose-pink blossoms of the Epilobium had been our constant companion up to now, but the dwarf birch, which grows along the ground, and yet is classified as a tree, had become more rare. On the other hand the small willow was still with us and its dry roots, burning easily helped out our stocks of petrol. Our observations and discoveries were of a very prosaic nature. Further down the valley we came across a well preserved cairn, a relic of the American Louise Boyd Expedition, which passed this way in 1933 with a large number of scientists.

The stage which lay behind us was a very strenuous one for all. The geologists carried out their researches on the walls flanking both sides of the valley, often right up to the highest peaks, so that we were often able to get in some good climbing. Haller succeeded in making a lone ascent of the impressive peak at the bend in the Knaekdalen, which was forthith dubbed "Les Diablerets". While he was doing this, we advanced the camp and brought up supplies; everyone was now in good training.

Yesterday we all climbed the Gog. This fine pyramid always bathed in sunlight and visible for days past, came fully up to expectations.

The east arête rising out of the Knaekdalen provided us with a fine climb. The aneroid gave its height as 8500 ft., one of the loftiest peaks in the region. The horizon was clear all round and the main attraction was the Petermann-Spitze, towering above all the other mountains. We were able to observe a large part of our next stage, leading up over the long ice-back of the Gregory Glacier. We looked back over our previous way of approach, the deep trough of the brown-coloured Knaekdalen. The dome of the ice-cap, which we were able to see for the first time in all its horrible endlessness, lay before us. This had been a fine mountain expedition and was a worthy appetiser for the adventures still ahead.

It was now time for household chores; Wenk busied himself with a large wash and from our nylon rope fluttered a colourful collection of shirts. Goetz snored peacefully in his tent, while Haller brooded over his collection of stones. I prepared an unfortunate hare for the pot. We were enjoying this day of rest; it brought us back into the normal rhythm. Tomorrow would be a harder day, when we set foot on the ice, in order to advance our camp.

The Petermann-Spitze

It was 4 a.m., a time corresponding to the normal rules of climbing at home. The sun was casting its oblique rays in complete clarity and our tents stood bathed in its light on top of a mound of scree above the Gregory Glacier. It had cost us considerable effort to pitch this beautifully situated camp at midnight, the night before last, in the frozen scree with the aid of ice-axes and geological hammers. We were 5600 ft. up and close to the highest mountain of North-East Greenland. It took us almost a whole day and half a night to come up from Camp IV with our sacks, along the back of the enormous glacier. It was a tiring journey on precarious ground; we had left the safe earth for ice. To-day we cooked a treble quantity of porridge, it had to last a long time, pot after pot was put on the small primus and nobly it did its job.

Two by two we tramped up the glacier; the good spirits of Greenland were on our side—for they produced the best and clearest sky imaginable. Yesterday, however, things did not look so good; the climb up from Camp V was accomplished in thick and heavy weather. The distant barrier of mist had pushed forward its peculiar rectilinear arctic cloud formation (the polar horizon) far into the clear interior. Thus there was a sort of heavenly tug of war going on overhead between the good and bad weather. The problem of the weather decisive for all our activities, could be safely ignored, at least for to-day.

We advanced rapidly, our goal was still concealed from us by the terminating peak of the mountains bordering the left bank of the Gregory Glacier. Then it suddenly came into view, this mountain which had been our goal for many days. Up to now it had lain concealed behind its protective screen of smaller foot hills, thereby increasing the tension, but now it was revealed in all its glory, sharply outlined in the clear air, rising abruptly from the great ice-field. It was as thrilling and theatrical as a stage set, and one did not have to be a "crazy mountaineer" to succumb to the allurement of this magnificent pyramid.

We steered straight for the north-east face of the mountain, time was passing and the ice-field was wide. The clearly visible tectonic structure and step-like strata of the short but steep south-east ridge gave us good hope of a successful ascent from this direction. We took a wide sweep round the mountain and at the same time went up the easterly ice-shoulder, climbing rapidly with crampons. Far below stretched the huge Nordenskiöld Glacier with its characteristic medial moraines. At last we reached the arête higher than expected, after climbing up over smooth but quite practicable ice-slopes. The aneroid stood at 1200 ft. Owing to fore-shortening it was difficult to form an opinion of the route, tower after tower, the ridge rose up before us, but with rocks seemingly free from snow. We lay down on some scree and made coffee; the silence was so intense that we were quite startled when a pair of snow-buntings flew past, chattering loudly.

From our position we were able to follow the route of the first conquerors of the Petermann Bjerg. Eight Cambridge geologists started out in 1929 to attempt the legendary peak, the conquest of which was long looked upon as doubtful. Like us they also came up the Kejser Franz Josephs Fjord and reached the terrain a mile or two south of our point of departure in the Knaekdalen. Their approach route was unquestionably more difficult and tedious than ours. We had the advantage of more recent geographical knowledge so that we had no difficulty in choosing our route. Whereas the English required eight camps to reach the summit of the Petermann, four only sufficed for our party. Led by Wordie, five climbers finally attained the top over the comparatively flat south-west arête, made difficult however by the downward dip of the strata, which finally necessitated a complicated outflanking manoeuvre. This ascent must be regarded as an extraordinary performance in view of the prevailing conditions. The traverse of the crevassed Nordenskiöld Glacier, 3 miles wide, and now lying about 5000 ft. below us, must in itself have been quite a stiff job.

We climbed on over scree and steep rock, but the tension of the early morning was relaxed. We had come to grips with the mountain and it had lost its inaccessibility. As far as possible we kept to the crest of the ridge which became steeper and steeper. The rock was bad, which did not worry us unduly as we were able to climb in safety. Meanwhile the geologists were working busily, knocking pieces off the mountain, the strata of which rose from the arête in a fine succession of towers and pinnacles.

The view expanded and we soon reached the base of the final pyramid. The arête now petered out in a fissured and weather-beaten face, topped by the slightly overhanging summit rocks, now plainly visible. The final peak terminated in a rock pulpit and a huge projecting ice-cornice, which had provided a problem for the English coming up from the other side. The climbing was beginning to become unpleasant and it was difficult to prevent stone falls, and volley after volley crashed downwards. The rock was clear of ice which was much appreciated by us. Slowly but surely we crept upwards through cracks and couloirs, up rock ribs and walls. It was not difficult going but the need to take care made every movement tiring. The steepest pitch was right under the summit, but everything went surprisingly well, for the lay of the strata was favourable and the overhand could be by-passed.

One after another we pulled ourselves up to the small summit block (Kanzel), which consisted of sloping slabs overhanging the vertiginous north-east face and just large enough for four men and a bottle of brandy! There was not a breath of wind, which was something to be thankful for on a Greenland summit at the edge of the ice-cap. The whole mountain world lay below us; we stood on the highest peak, just below 10,000 ft. above sea level. The panorama was unbelieveable. The ice-cap lay like a white shimmering sea which threatened to submerge the mountains with its icy flood. One seemed to be at the end of the world or at the beginning of creation and permitted a glimpse of the limitless and unformed chaos. Far away in the distance beyond the Nathorst-Spitze could be seen the blue waters of the Kejser Franz Josephs Fjord. Beyond the coastal area and the pack-ice, about 100 miles away, lay the usual bank of cloud.

The brandy, which had been brought along surreptiously, did its stuff, except that the bottle was far too small to provide enough for the numerous toasts—to the conquered peak, to Greenland, to us, to to-day, to-morrow, the day after to-morrow, and finally to the cognac itself—so long as there was any left! Under a couple of stones we found an empty ginger tin containing the brief report of the first climbers and their five names. Now, twenty years later, we added ours thereto. As well as this official document we put an Ace of Hearts in the brandy bottle, signifying the personal individuality of the party and laid it alongside.

We remained on the summit for hours enjoying the vast panorama, despite the fact that the temperature had fallen to below zero. Haller decided to push on next day to the edge of the ice-cap in the as yet unexplored nunatak zone, which could be seen from here in its entirity. I said I would go with him.

A light wind sprung up and it got cold. It was time to go down. We descended the same way without much difficulty and as we raced downwards the mountain soared above us higher and ever higher. We almost ran down the ice-shoulder below the arête and across the wide ice-field. We got back to camp after midnight, had supper and celebrated as is usual after a great day in the hills.

Nunatak zone

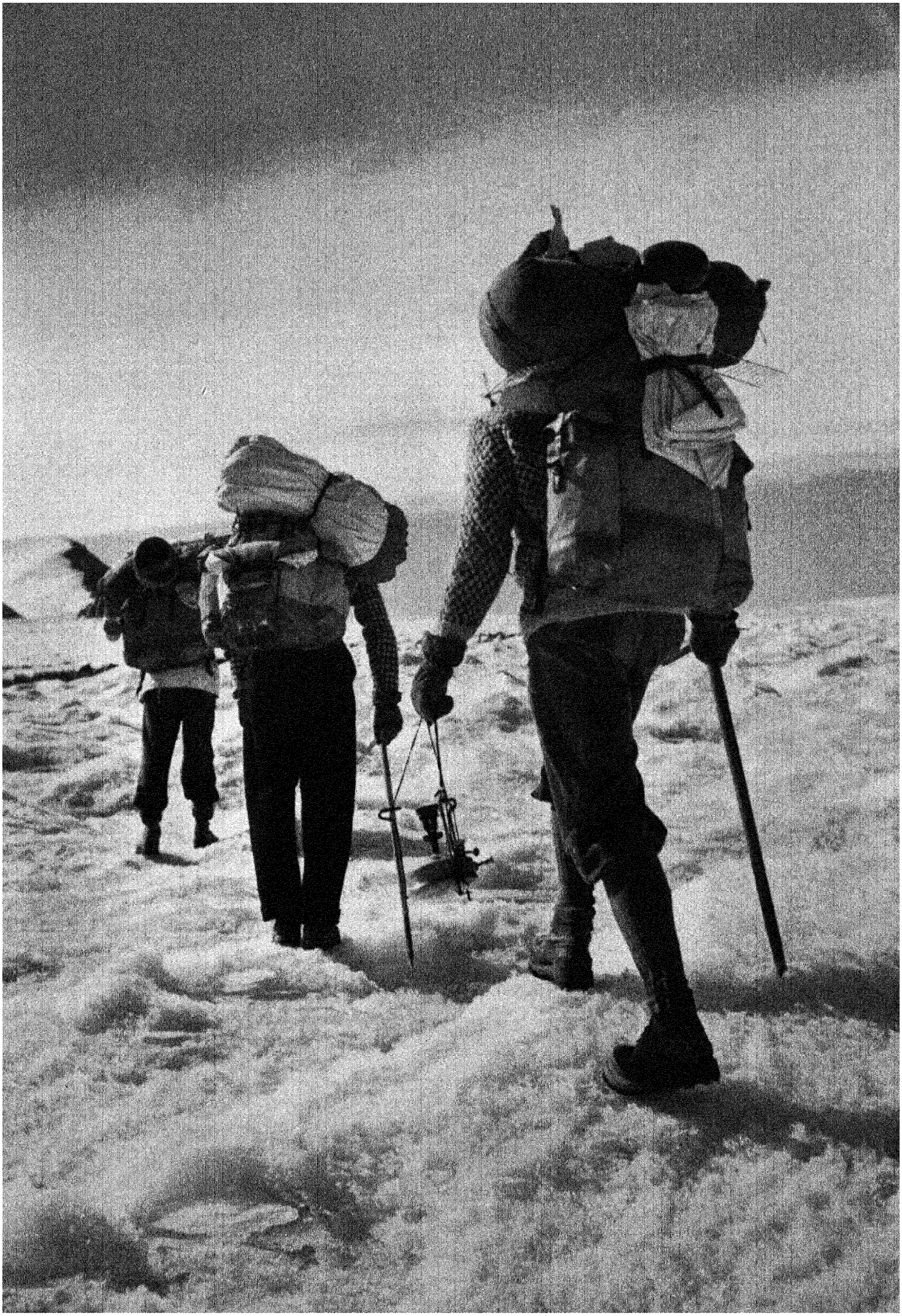
Haller and I were alone, the other two having set off northwards to the last food dump. They became smaller and smaller and were now just dark specks on the endless white glacier plain. We were alone. The sun was westering and the long shadow of the Randberg glided over the tent. It was very cold and we got into our sleeping-bags and prepared the evening meal. The primus sang and warmed us, enveloping us in its magic cloak of safety. The mind was at rest, thoughts melted into dreams.

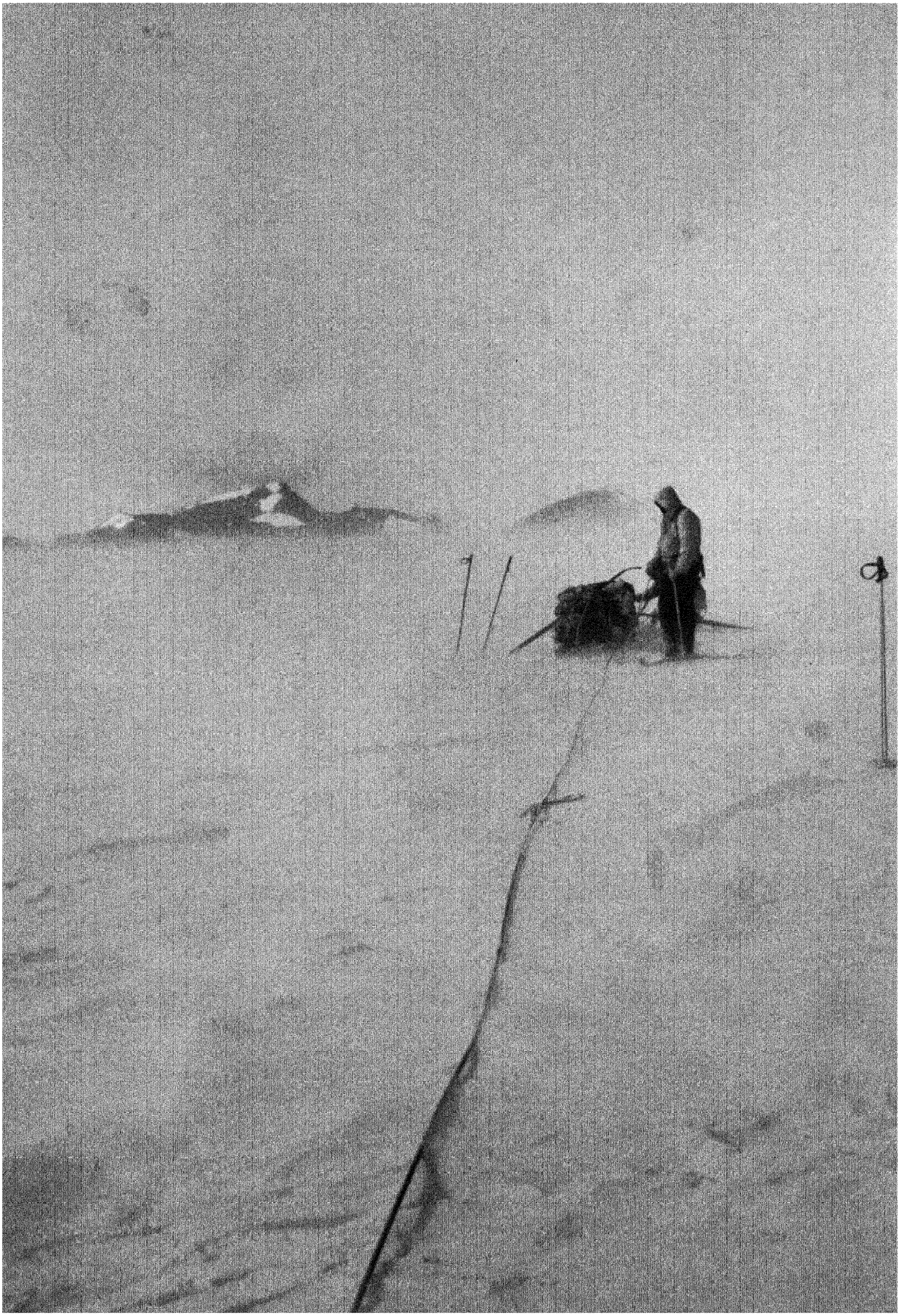
However we had to go on, was we had a long march before us through the clear polar night. We intended to make a wide detour to the furthest nunataks, the advance guard of Greenland's icy mountains at the edge of the white ice-cap. We calculated four days as necessary for this trip and our provisions were based upon this assumption. It did not give us much time but the everlasting daylight aided us.

We took down the tent, shouldered our packs and set out. Our camp disappeared leaving only a black mark on the ice. Once more we were homeless and on the march again. We climbed up over our old tracks along the broad ice-ridge which led towards the Petermann. Contouring the corner mountain, a fairly high pass at the head of a tributary glacier indicated the way westwards over

Plate 61 : En route, heavily loaded, for the Petermann Bjerg.

Plates 62–63 : Petermann Bjerg (9646 ft.), highest peak in North-East Greenland, seen from the north-west in August 1951.





to the ice-cap. We had left our old tracks behind, the cold creased and at the witching hour we reached the pass.

We looked down upon an endless and unfamiliar land. The dark outline of the Petermann rose behind us, its summit bathed in the rosy hue of the midnight sun. The rest of the world was sunk in blue twilight. The ice looked like a huge wave stretching away in the distance, while the mountains from whence we descended appeared to dissolve into separate ridges, towers and needles, surrounded by ice and gradually fading away into a frozen waste. We roped up and set off over the endless plain. The spectral twilight was deceptive and we could no longer accurately judge contours nor the direction of our route. This world of absolute silence was no longer easy to comprehend and we wandered through it like moving dots, step by step, scarcely without knowing why. There was a peculiar feeling of being lost, conscious of one's own aliveness in this dead primeval and forgotten world.

We made but slow progress as the surface was very tiring, a layer of pure powder-snow overlay the crust, which was only strong enough to hold us for a step or two at the most. Every step had to be made with the utmost care in order to avoid breaking through up to the knees—which nearly always happened. Oh for two pairs of short summer skis! This fervant plea directed heavenwards by two lonely Greenland pilgrims, possessing only a rope and a sack, was not likely to be taken seriously up there and so we went on, hour after hour. The temperature was now nine below zero (C.) but it was a dry cold and did not worry us. The frequent wide crevasses troubled us, as they were very difficult to pick out in the bad light and drifted snow.

We steered towards a black rock island sticking out of the ice and were very glad to have firm ground once more under our feet, after seven hours of marching over a treacherous and uniform surface.

"Caliph" was the name we gave to the mountain at the foot of which we pitched our tent to cook, for it put us in mind of the fairyland of the East—in this way is Greenland's geography made!

After completing our geological tasks, we had a wonderful soup, which thoroughly warmed us up before continuing the journey. The morning sun had removed the spectral veil from the landscape. Our way led diagonally across an unnamed glacier, at the further side of which was a long and low mountain chain, looking like a weathered and giant bone protruding from the ice. We had reached the end of this very tiring stage in the journey.

It was not alone the mysterious night that played tricks with us, now it was broad daylight and the most bizarre illusions became apparent. We were in the

Plate 64: En route for Hobbs Land in a blizzard.

centre of the long and wide ice-field extending for many miles, lying silent in the hard clear light of morning. Suddenly the tops of the surrounding nunataks began to glow as in a fire, the pinnacles flickered and wavered as if in a state of catastrophic decomposition, no sound broke the silence. When the sun had moved a little, this phantasy disappeared and the mountains took up again their usual solid form.

We got to the rock-ridge at midday and christened it the "Wolfsrippe", after the track of a wolf, which came straight across the glacier and ended here. It was unusual that such a large animal could manage to exist in such a waste. The ground on which we pitched our camp, high above the ice, closely resembled a Roman theatre. There were columns, capitals and plinths, and Haller observed with pleasure that to-night we would sleep on new rock of crystalline structure. The tent was pitched under a ledge of rock from whence the ice-cap could be surveyed. Straight as a die Knudsen's Nunataks stood there, the last line of defence of solid ground against the moving ice. Our destination to-morrow was the nearest of these rock-ridges, each looking exactly like the other. We went into the tent and got into our sleeping-bags, once more we were lulled by the sound of the primus, which had the effect of making our tiny dwelling into a world of its own—our home. After a protracted supper Haller resorted to his mouth organ as usual and the familiar potpourri followed, beginning with "O Donna Clara" and ending up with a somewhat slipshod waltz. This sequence was as immutable as the laws of the Meads and Persians and never varied.

We lay in the tent while the wind howled outside and thick snow fell; it was not possible to see more than twenty paces. We slept well into the day and hoped for better weather. The rest did us good, but we could not afford to wait too long; if it continued to-morrow, we should have to consider whether to eat our socks or our shoes.

Yesterday we had dawdled along over the Victor Madsens Glacier to Knudsen's Nunataks, to which we gave the names of various hills near our home town on the Rhine. Thus the ice-cap was sprinkled with names like Spalenbjerg, Klosterbjerg, Steinenbjerg and the like. On the return trip to the "Wolfsrippe", the weather was sultry and oppressive and sulphur-coloured clouds gradually spread over the sky. During the night the storm broke and tore out a couple of tent pegs, otherwise doing us no harm.

Next day, late in the afternoon, Haller read out extracts from last year's diary. The excerpts most favoured were those dealing with food and cooking, especially the preparation of a roast musk ox. We checked our provisions once more, and after a good meal we turned in, leaving our future in the lap of the gods.

The gods were good to us; we were spared a heroic march through storm, mist, ice and cold; in fact we were able to leave our camp in beautiful weather and travel 10 miles in the direction of the Gregory Glacier. We were now only one day behind schedule. The crossing of the various glaciers was rather unpleasant owing to the numerous crevasses, which were usually not seen before the ground gave way beneath one.

We rested at about 6500 ft. in a hole in the rock on the mighty Cerberus, which barred the way to the Gregory Glacier with its massive shoulders. With empty stomachs, but full of idealism, we climbed to-day over the crest of this impressive mountain up to the summit. Once more we were afforded a view of this strange landscape of ice and snow, through which we had wandered for so long.

Now all our inclinations were directed towards the depths and the thought of the placid regions of the fjords filled us with a feeling of pleasant unrest. Everything edible was finished up and we set off in the evening completely cleaned out, in order to get through to the food dump left for us by our friends on the Gregory Glacier. We crossed a wide snow-field and from the top of a pass saw the longed-for glacier far below. At the full length of the rope we crossed and circumvented the crevasses of the broken-up glacier. Everything went well, for the glacier was completely snow-free and all crevasses were plainly visible. After a rapid march over the flat and smooth glacier, ideal for crampons, we reached our goal. We found all sorts of delectable things at the dump. We descended the ice-stream at midnight and in the early hours of the morning we stood once more on the soft brown moss of the arctic tundra at the foot of the Gregory Glacier.

The ice was left behind to our great relief. Our friends' tent stood in the old place and we surprised them asleep. We immediately had a reunion celebration, for we were too tired to go to sleep. The Knaekdalen was already arrayed in autumn colours, a great summer was coming to an end. It had shown us a land, the silence and remoteness of which would always provide an irresistible attraction.

FROM HOBBS LAND TO STRINDBERGS LAND

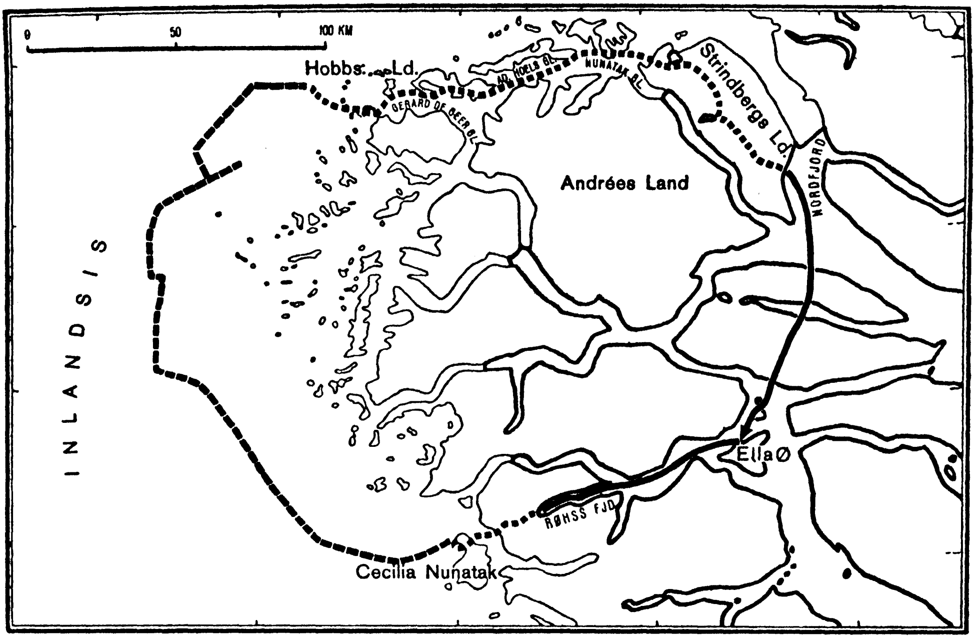
By Wolfgang Diehl

In the summer of 1951 the objective of the Zurich geologist, Dr. H.R. Katz, was to examine a cross-section of the nunatak zone; Hans Röthlisberger and I were also there as assistants. The predetermined route ran from Hobbs Land at the edge of the ice-cap at about 74° latitude up to the north-west corner of Strindbergs Land. It followed the northern boundary of a huge glacier system, which streamed down from the high plateau of the ice-cap immediately south of Hobbs Land and flowed into the Geologfjord 75 miles away, between Andrées Land and Strindbergs Land. The upper course of this system eventually turned south and became the Gerard de Geer Glacier, then the Adolf Hoels and finally the Nunatak Glacier.

Althoug the terrain in question had been crossed by us only once before (west to east crossing of the ice-cap in the 30's), we had at our disposal a fairly detailed collection of maps (1:250,000). These maps, based on air photographs by the Danish Ordnance Survey, contained a number of mistakes and omissions, but in the main they were sufficient for orientation purposes.

The detached position of Hobbs Land and the extent of our working territory for more than 60 miles right through the glacier system and far away from the fjord, demanded considerable planning and organisation. The main problem was to reach Hobbs Land, our point of departure, with all our equipment within a reasonable period of time. The solution was to collaborate with the French Greenland Expedition, which had been exploring the ice-cap for several years. Their leader, Paul Emile Victor, had promised to put all their transport at our disposal, consisting of aircraft and Weasels (American tracked vehicles). We thereupon decided upon the following plan. We would be taken from Ella Island by one of our own expedition's aircraft to the Röhss Fjord and from there we would go on to Cecilia Nunatak, at the east end of the ice-cap (about 72° 30' N.) by forced marches and with light loads, where we would meet a party of the French expedition. At the same time the Islandic supply aircraft of the French would pick up our pre-prepared equipment in Reykjavik and drop it by parachute at our meeting point. We would then be transported together with our equipment by Weasel, in a wide westerly sweep through the ice-cap to Hobbs Land (74° N.).

After that we could no longer reckon with outside assistance. The route from thence to the north-west corner of Strindbergs Land led through the already mentioned system of glaciers, followed by our predecessors. We intended wherever possible to make use of skis and sledges (without dogs). As regards the



▬▬▬ *Air routes.* ▬ ▬ ▬ *By Weasel.* ………… *On foot.*

return journey, we determined to traverse Strindbergs Land to Magdalena Lake by a route known to Katz, where a Danish aircraft would pick us up at a pre-arranged date and convey us to Ella Island. It was not possible to estimate accurately the time required for this trip, but we reckoned on a minimum of three weeks, actually it worked out at exactly 31 days.

The following points were of importance in assembling our equipment: as regards the outward journey, thanks to the use of aircraft and Weasel, weight need not be taken into consideration, in fact we were able to take along sufficient reserve equipment to provide against any losses due to parachute dropping. We had to carry our own equipment from Hobbs Land to Magdalena Lake, a distance of about 95 miles, and taking about three weeks, which we proposed to do by sledge and later by load humping, at which stage we had already decided to leave behind everything except actual necessities. We would find a fuel and food depot at Magdalena Lake, which would be landed there by aircraft from Ella Island, in the meantime. When we got to Strindbergs Land, but not before, we could survive by hunting. At the same time we did not think it unreasonable to be prepared for all eventualities in this far off territory of mountains and glaciers, cut off from all communication with the outside world.

Given all these circumstances, it was not surprising that all our equipment, when finally put together, made a considerable pile; it included the following—two Norwegian sledges, two small light tents, sleeping-bags with undersides of reindeer skin, ski and mountain equipment, two nylon ropes, Alpine line, first-aid outfit, cookers, oil and petrol, a rifle with some fifty cartridges and much else. In addition to all this was an enormous quantity of food. The principal foodstuffs, which had to be light and of a non-freezing kind, of particular importance for us, consisted of the ubiquitous pemmican, Ovomaltine and Ovosport. On the first part of our trip, we took along several boxes of Danish food, which though containing all manner of good things, were not entirely suitable for our kind of expedition. We liquidated their contents as soon as possible and anything over, such as tins of meat and fruit, was left for the French.

On receipt of a radio message informing us that the Weasels had arrived at the Ceclia Nunatak, we left Ella Island on the night of the 29th to the 30th July en route for the ice-cap. Everything went according to plan; the crossing of the mighty Wahlenberg Glacier, with its surface lakes and streams and the treacherous pools of melted snow covered with a thin coating of ice, gave us an idea of the obstacles in the way of a mid-summer traverse of a glacier in the Arctic. After a march of some 28 hours, we finally arrived on the afternoon of the 31st July at the pre-arranged meeting place on the Cecilia Nunatak, where we received a hearty greeting from G. Rouillon, the leader of the French Weasel party and his friends.

Our equipment was dropped by parachute the same morning, all intact except one case. We rested for 24 hours and then started off in three Weasels, with two Frenchmen to each, towards the slightly undulating plateau of the ice-cap. For the next three days we were surrounded by the infinite and boundless snow-desert; there was nothing to be seen except to the right, where from time to time the mountains on the eastern edge of the ice-cap became visible, the enormous pyramid of the Petermann dominating everything. In this way we covered nearly 200 miles, at a height of from 7900 to 9200 ft. above sea level. Having arrived at 74° N., we tried three times without success to go down to the lower nunataks. Each time our heavily-laden motor-vehicles were stopped by large snow-covered crevasses.

In view of this, on the morning of the 5th August we decided to continue to Hobbs Land on foot; so we loaded up our sledges and bade farewell to our French friends, who intended to wait until we got down to the nunatak zone before continuing their journey to Cecilia Nunatak and thence to their expedition base at Eismitte Camp, about 450 miles distant.

Our descent of the steep ice bluff to the lower glacier surface of the nunatak zone, 1300 ft. below, was successfully accomplished. The numerous crevasses impassable for Weasels were crossed by our skis and sledges without undue difficulty. They were covered for the most part, but the bridges were not frozen and snow conditions generally were similar to those obtaining at home in the winter. The crossing of the heavily loaded sledges tied together was a laborious and time-wasting business, one man going ahead while two acted as brakes behind. On level stretches, two or three had to pull, all this making it necessary to make frequent changes in our belaying tactics. This latter was a necessity, as we had one case of a break-through, the only one on the trip, fortunately without consequences.

As soon as we saw that our route to the centre of the nunataks lay open, we gave the pre-arranged smoke signal to the French and with the aid of field-glasses were able to see that they began their return journey immediately. We were now completely alone in this world of ice, nearly 100 miles distant from Magdalena Lake, which we hoped to reach in about two weeks time. The last obstacle which we encountered was a steep and smooth ice-slope, which demanded the use of crampons. We had to let each sledge down carefully, one at a time and then made tracks over the flat glacier floor towards the end of a rocky ridge, where we intended to make our first independant camp. It was still bitterly cold, if not quite as bad as on the ice-cap, where we had measured temperatures as low as −30° C.

In order to make quite certain that we had reached the right spot, we spent the next day in climbing the highest summit, which we christened "Rekognoszierungs-Nunatak". While we "assistants" proudly and with much zeal erected our first nunatak cairn, Katz was able with some difficulty to identify our position with the aid of maps and air photographs, as Point 2400 and about 7½ miles south-west of Hobbs Land. An immeasureable welter of mountains lay before us; to the east our vista extended over a huge glacier system, maybe four times as wide as the Aletsch Glacier and very much longer. This was our route to Strindbergs Land for the next 18 days. But what captivated us was the astonishing prospect of the icy nunatak zone and the crevassed undulations of the ice-cap, shining in the false light. That evening we returned late to camp.

On the 8th August we at last reached Hobbs Land. In contrast to the isolated peaks and ridges of the nunataks, this terrain had all the appearance of a compact little mountain massif. For one whole long day, without the sun setting, we climbed along its flat back, which ran towards the west and north straight into the high plateau of the ice-cap. Right at the edge of the ice we came upon the bleached skeleton of a young reindeer, it must have perished of hunger, for the nearest sparse grass pastures were about 50 miles further to the east.

From here we followed the huge glacier system towards the east; one day was like another and yet each brought something new. We only progressed about 7 to 10 miles a day, on skis as far as the snow-line (about 5500 ft.), and then on foot. The advanced season was in our favour, as the autumnal cold had set in and the many glacier pools, which would have caused us trouble ten days or more ago, were now completely frozen over again. We were able to drag our sledges easily over the mirror-like surface of the ice for long distances, without encountering any crevasses. The surface, however, was criss-crossed with melt water rills, quite tiny to begin with, but gradually increasing in size as we advanced, until they became deep glacier streams with vertical walls 6 ft. or more in depth. Fortunately they were empty, but it was often difficult and tedious to cross them. Our heavily laden sledges did not stand up to the strains and stresses indefinitely and repairs accumulated. Eventually one broke down altogether and then two stages later, the second. As we were now forced to carry everything on our backs, we were obliged to leave behind all that was unessential. Some time before this, before we even reached Hobbs Land, we had had to leave behind a tin of pemmican —emergency rations for almost 14 days—lateron at Eleonore Lake we dumped skis and petrol tins and shortly after that our second tent, finally jettisoning my welltried nylon rope. Our food was now reduced to a minimum so that it was just sufficient to last until we got to Strindbergs Land, where, as Katz knew from personal experience, we should encounter herds of musk oxen. Apart from these transport troubles, the journey provided us with fresh impressions and showed us the mountain world from another angle with the fascination of new camping-sites.

We were often able to put in a day or two of geological survey of the surrounding peaks between stages, which meant long marches but lightly loaded. There were rarely difficulties of a climbing nature, as most of the mountains were nothing but scree rising up to 5000–7000 ft. As regards the snow, we never encountered good névé but always icy slopes, difficult to get up without using crampons. On one occasion only did we have a good but short pitch. This was up a steep granite needle, which towered above the lower north bank of the Adolf Hoels Glacier.

We reached Strindbergs Land on the afternoon of the 25th August, finally leaving behind us the large glacier system which we had followed for weeks and which was no longer practicable in its lower reaches down to the Geologfjord. With great delight we threw away our crampons, indispensable up to now but which had only been held together for some time with pieces of ski cable. Before us lay a long snow-free land of rocks, only the mountain ridges being snow-covered. After a march of several hours, we reached Granit Lake, where, as we already knew, the last obstacle awaited us. If we could not manage to cross the wide and rapid outlet of this lake, we would have to wait for an expedition aircraft to drop us a rubber dinghy. This would mean several days delay for which we no longer had supplies and besides, we made it a point of honour to get through without help of this nature. Two hours later, wet through, we pitched camp on the further bank. We were now in wellknown territory, as Katz had reached this point from the fjord two years earlier. Yet another thing relieved us considerably; Katz's musk oxen really existed. We had already seen groups of these strange buffalo-like animals while approaching Granit Lake, so that our commissariat difficulties were ended for the next few days and we knew that we could rely on a food dump at Magdelena Lake later on. This evening we were only able to kill an arctic hare, which we cooked with the last of our pemmican. Next day we followed the bank of Granit Lake and turned off into a long winding alpine valley with beautiful soft grass, on which herds of musk oxen were grazing, and sides festooned with hanging glaciers. We were forced to kill a lovely musk calf, for our food was finished and there was nothing smaller in sight. The superfluous meat was left for the foxes, together with our cooker, which we could not carry with us as our sacks were already too heavily loaded with rock samples. Anyhow, we would find another one at the dump, an in any case we had no more fuel. We marched for several hours through this alpine valley until after crossing the low pass at its head, we were able to descend over troublesome scree slopes to Magdalena Lake, where our food dump should be. But to our surprise it was not there, no cooker and no fuel. Somewhat abashed we retired for the night, hungry.

After having waited 24 hours in vain for the aircraft, we decided to go on to the Nordfjord, 20 miles distant, where we knew there was an expedition hut, unoccupied but plentifully stocked with provisions. We left our tent and superfluous equipment with a note for the pilot of the aircraft. We started at 10 p.m. and five hours later reached a small food dump which Katz had left behind two years ago. After a good meal and a short sleep we continued on our way in the early hours of the morning. The same afternoon we arrived at the expedition hut, via the pretty Brogedal on the Nordfjord and a few hours afterwards the aircraft flew in, having found our camp at Magdalena Lake. We warmly greeted our friends and learned that they had been looking for us for a week. It had not occured to us that on Ella Island they were getting uneasy about our prolonged absence. Shortly afterwards we flew back to the base camp over the mountains and fjords shining in the evening sunlight.

CONCLUSION

Nearly all the trips described herein were undertaken for scientific purposes, rather than for mountaineering. For this reason, the report is more of a technical nature and does not provide the reader with the tales of adventure and dangers which might be expected.

The mountains for us were not an object for exhibiting our climbing propensities but rather a subject of internal exploration from a geological standpoint. For this reason it must be made clear that full scientific details of our expedition are published in Copenhagen under the title of *Meddelelser om Grönland.*

Before terminating this collection of reports from North-East Greenland, we should like to express our thanks to the state of Denmark and the leader of the Danish East Greenland Expedition, Dr. Lauge Koch, for the confidence placed in us and for the assistance upon which we could always rely. *E.F.*